JIMMA UNIVERSITY

NATURAL AND COMPUTATIONAL SCIENCE DEPARTMENE OF SPORT SCIENCE

ASSESSMENT OF SELECTED HEALTH RELATED PHYSICAL FITNESS COMPONENTS BETWEEN URBAN AND RURAL HIGH SCHOOL STUDENTS OF SOUTH WOLO ZONE

BY

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APROVAL SHEET

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Biography

My name is Biniyam Worku. I was born on 23 October 1988 in Dessie, Ethiopia, where I lived until the time I went to university in another placer. I'm the only child for family. My father, Mr. Worku Jemberu was a police man and my mother is Mrs. Ayalnesh Tefery she was a house holder. I went to school in Memhir Akalewold where I completed my elementary and high school education respectively. Then, I went to Mekelle University in 2010, where I did my under graduate degree in sport science, then I become teacher of physical education and start work in Jimma zone, omo nade wereda, boneya town in 2013. Know I am living in dessie.

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Acronym

AAHPER=American Alliance for Health, Physical Education and Recreation ACSM=American collage of sport medicine. BMI=body mass index

BPM=beat per minute

BMI=body mass index

BPM=beat per minute

CAPL= Canadian Assessment of Physical Literacy CDC=center for disease control.

CHD=coronary heart disease.

CVD=cardiovascular disease

FAO=food and agricultural organization

NASPE=national association for sport and physical education.

NIDDM=non-insulin dependent diabetes mellitus.

No=number

PA=physical activity

PE=physical education

Popu=population

SAMP=sample

S. D=standard division.

WHO=worried health organization

Abstract

The purpose of the study was study to compare selected health related physical fitness levels of Rural and Urban high school Students of south wollo zone. To achieve the purpose of the study, 40 Rural and 40 Urban high school Students of south wollo zone were selected by using random sampling technique from purposely selected woredas of south wollo zone. The data collected were statistically analyzed using descriptive statistics of mean and standard deviation and inferential statistics of t-test for differences between in health related physical fitness of Rural and Urban high school Students. The finding of the present study indicates that the mean and standard deviation values on strength (standing broad jump) between Urban and Rural high school students, Urban high school students were recorded as 1.44, 0.24 and Rural high school students were recorded as 1.55, 0.26. It shows that strength of Rural high school students is significantly better than Urban high school students. The result of the study indicates that the mean and standard deviation values on Endurance (modified 90-degree push-up) between Urban and Rural high school students, Urban high school students were recorded as 9.08, 2.56 and Rural high school students were recorded as 9.75, 2.92. It shows that Rural high school students are better than Urban high school students Flexibility (sit and rich) between rural and urban high school students, that Urban high school students were recorded as 2.45, 2.07 and Rural high school students were recorded as 2.34, 1.89. It shows that Urban high school students are slightly better than Rural high school students. The study clearly shows that the mean and standard deviation value on the body composition (BMI) between rural and urban high school students, Urban high school students were recorded as 21.22, 1.83 and Rural high school students were recorded as 20.03, 2.37. It shows that Urban high school students have higher BMI than Rural high school students.

Key words: Rural, Urban, muscular strength, muscular endurance, flexibility,

CHAPTER ONE

1. INTRODUCTION

This chapter consists the basic aspects that can give essential information on the general knowledge of the study. It describes the background of the study, gives some highlights concerning to what the problem is about, objectives, hypothesis of the study, and identifies the significance as used in the research documents.

1.1.BACK GROUND OF THE STUDY

Development and refinement of movement skills through a variety of PA is a normal part of growth and functional development (Malina et al., 2004). Fundamental movement patterns develop during preschool ages and with maturation and growth, these movement skills progressively become integrated and coordinated into more difficult PA performances that characterize different free play and games through school years (Strong et al., 2005). Physical fitness comprises a number of components (aerobic endurance, muscle strength, muscle endurance, flexibility, and body composition) and there is no clear and consistent association between all measures of fitness and PA. While many studies have found PA strongly related to aerobic fitness (Raudsepp & Jurimae, 1998; Castelli & Valley, 2007), only weak relationships have been observed with other measures of health-related fitness (Pate et al., 1990; Sallis et al., 1993) including body fatness (Parsons et al., 1999). Anecdotal evidence and media reports suggest that a PA transition is emerging in many developing countries (Ang'awa, 2009; Njung'e, 2009; IRIN, 2009). The problem appears to be related to urbanization (Ziraba et al., 2009), reduced lifestyle-embedded PA, and an increase in sedentary behaviour (Duda et al., 2009).

Data on the habitual PA and physical fitness among children particularly among populations in developing countries is on the rise. The PA transition has been identified as a behavioral shift from traditionally active lifestyle to more industrialized and sedentary lifestyle (Muthuri et al., 2014; Anywhere et al., 2012). Exacerbating the fight against the PA transition and commensurate rise in childhood obesity is the strong socio-cultural beliefs in many developing countries that obesity, or "roundness," is something to be revered and a sign of wealth and prestige (Onywera, 2010). The study had the objective of assessing the motor skill ability and health related variables in 9-11year old children in Nairobi County using a protocol called the Canadian Assessment of Physical Literacy (CAPL). Health-related physical fitness consists of different attributes, of which body composition and cardiorespiratory fitness are important. These attributes are measures of most

bodily functions, which work in an integrated manner (skeletomuscular, cardiorespiratory, circulatory, endocrine-metabolic) in performing daily PA and physical exercise (Esmaeiadeh & Ebadollahzadeh, 2012:105). Being physically active is very essential and the importance of PA cannot be over emphasized as a priority for public health promotion and interventions targeted at disease prevention (Strong *et al.,* 2005: 732; Pahkala, 2009:14; Witt-Glover *et al.,* 2009: 309-334). Bouchard and Shepard proposed a conceptual approach to the complex relationship between physical activity, fitness and health. Their health-related fitness refers to the state of physical and physiological characteristics that define the risk levels for the premature development of diseases presenting a relationship with a sedentary mode of life. The current emphasis in physical fitness has shifted from performance-related to health-related indicators.

Health-related physical fitness has been viewed as a narrower concept focusing on the aspects of fitness that are related to day-to-day functioning and health maintenance. The concept of health-related fitness is operationalized as a composite of cardiorespiratory endurance, musculoskeletal function of the lower trunk (abdominal muscular strength and endurance and lower-back/upper thigh flexibility) and body composition, specifically adiposity. Also, besides this muscular, motor and cardiorespiratory component, the health-related fitness includes a morphological (body mass for height, body composition, subcutaneous fat distribution, abdominal visceral fat, and bone density) and metabolic (glucose tolerance, insulin sensitivity, lipid and lipoprotein metabolism, substrate oxidation characteristics) component. Although BMI and body fat percentage are not measures of physical fitness *per se,* they significantly affect the physical fitness of children and constitute a component of physical fitness, which is why they are included in this study as health-related physical fitness variables. Many factors are associated with adopting and maintaining a physically active lifestyle, such as socioeconomic status, cultural influences, environmental factors and health status. Fitness is an individual matter. it implies the ability of each person to live more effectively with his potentiality of function and depends upon the physical, emotional, social, and spiritual components of fitness which are related to each other and are mutually interdependent. physical activity has important implication for the health and well-being of all individuals. Easy life has negatively influenced the development and maintenance of physical fitness. physical fit is an important component of total fitness. [*James Buchan 1932*] fitness is the state which characterizes the degree to which the person is able to function. fitness is an individual matter it implies the ability of each person to live most efficiently which has potentiality. Ability to function

depends upon physical, mental, emotional and social components of fitness, all of which are related to each other and mutually interdependent.

Human body is a gift by nature. Life in the computer age is not less than the blessings of God. Scientific discoveries have changed the entire face of our planet. It has changed the entire face of our planet. It has changed the thorny life into the bed of roses. Good health provides sound and solid foundation on which fitness rests and at the same time fitness provides one of the most important key to health and living one‘s life to fullest. In villages which formed the first habitation of civilized man rural sports grew out of sheer necessity. Joint defense against on sleight of a common foe and dangerous animals must have given birth to sports like wrestling, running, jumping, weight lifting and such performing arts as measuring strength by holding wrists, twisting hands etc. Same is the case with games and sports in rural and urban settings. We notice that there is a lot of difference in the interest of children. Like we observe that in rural areas children are indulging in minor, indigenous activities and field games like football, kabaddi, khokho, hockey, wrestling, athletics etc. whereas, in urban we find children playing basketball, swimming, badminton, tennis, squash, golf etc. The main cause of difference is the availability of facilities and financial support of parents.

The urban people with the growth of cities has come a great transformation in the living habits of society. The city is the hub of much social life, and it influences its standards. Intellectual growth and habits, moral codes and conditions, behavior patterns and cultural conditions resolve around it. New communities, new group, new ethnic relations and a multitude of classes make of the city an intricate and complex unit of modern society.

Schools have the potential to improve the health of young people by providing instruction in physical education that promotes enjoyable lifelong physical activity. Diseases and health problem resulting from an inactive life style have their origins early in life. This is when an active lifestyle should be established. Fitness begins at birth and should continue throughout a person`s life. Physical activity and fitness behaviors should be normal and necessary part of everyone`s life. Fitness improves s general health and it is essential for full and vigorous living. The physically fit child feels more alert and eager to do things. A weak child is a weak brick in the wall of the nation. The wealth of a nation depends entirely upon the health of every citizen of the country. The National College of Health Risk Behavior Survey reported that 35% of American college students are overweight (Lowry *et al*., 2000). This is not surprising considering that more than two thirds

of American adult population are classified as overweight (Flegal *et al*., 2002), making weight gains America's leading health problem (Mokdad *et al*., 2001). The expert committee of the World Health Organization (WHO) described physical fitness as "the ability to undertake muscular work satisfactorily." Every person has a different level of physical fitness which may change with time, place of work, situation and there is also an interaction between the daily activities, and the fitness of an individual, the point if where to put the level of optimum fitness. From the physiological point of view physical fitness may say to be the ability of a body to adopt and recover from strenuous exercise. In the past, the normal routine of daily living required vigorous work and physical activity. Children did more walking for transportation and played outside more often. Today, concerns about safety prevent many parents from even allowing their children to play in their neighborhoods. Machines, communication devices, computers, video games and other electronic conveniences have greatly diminished wealth enhancing levels of physical activity from our lives. Obesity has reached unprecedented levels among children and adults.

Physically fit child feels more alert and eager to do things. A weak child is a weak brick in the wall of the nation. The wealth of a nation depends entirely upon the health of every citizen of the country. Hence physical fitness of school children is major factor to be considered. So, School physical education programmers should include multi furious activities appropriate to each age group. The complex nature of physical fitness can have understood in terms of its components such as cardio-vascular endurance, strength, flexibility and muscular endurance. In addition to these components of physical fitness there are many other factors which contribute to physical fitness including heredity, living standard, nutrition, hygienic conditions, environmental and climate factors etc.

1.2 Statement of problem

Along with the modernization of the world, most of the technologies nowadays have make people less active. They do less work but achieve more output as this is what we call efficiency, to do something with little input but bring out more input. As the technologies becoming more advanced, people are less making work and this resulting in the decrement of fitness.

Gill, Deol and Kaur (2010) conducted a comparative study of physical fitness component of rural and urban female students of Punjab University. In the present study an attempt has been made to compare physical fitness components namely speed, strength, endurance, agility and flexibility between female students belonging rural and urban set-ups and Rural female students were found to be superior in strength, endurance, speed and agility where urban female students on the other hand, were found to be superior in tasks like flexibility.

Abate Tesfaye (June 2013) conduct study to investigate physical fitness levels of Rural and Urban secondary school Female Students in Hadiya zone and found that rural female students are comparatively better than urban female students in Hadiya zone. Rural female students are superior to urban female students in Strength, Endurance and Speed whereas urban female students are superior to rural female students in Agility and Flexibility.

Fetiya Kedir and Mekbib Alemu (2019) The objective of the present study was to compare selected health related fitness level of urban and rural background students in secondary schools of Hawassa, Southern Ethiopia. From the selected study participants 215 were from grade 9 and 185 participants were grade 10 students. The result most health related fitness rural students were found to be higher than those of the urban students.

The researcher interested to conduct this research because the researcher believe that the health related physical fitness levels between urban and rural high school students, will have to be compered, assess and evaluate, Further, no study on the prevalence of health-related physical fitness components in south wollo zone so this study might help to fill these gaps.

1.3 Hypotheses of the Study

H0: There is no significant different in muscular strength between rural and urban high school students of south wollo zone?

H1: There is significant different in muscular strength between rural and urban high school students of south wollo zone?

H0: There is no significant different in BMI between rural and urban high school students of south wollo zone?

H1: There is significant different in BMI between rural and urban high school students of south wollo zone?

H0: There is no significant different in muscular endurance between rural and urban high school students of south wollo zone?

H1: There is significant different in muscular endurance between rural and urban high school students of south wollo zone?

H0: There is no significant different in flexibility between rural and urban high school students of south wollo zone?

H1: There is significant different in flexibility between between rural and urban high school students of south wollo zone?

1.4 Objectives of the study

1.4.1 General Objective

The main objective of this study was to assess selected health related physical fitness levels of Rural and Urban high school Students of south wollo zone.

1.4.2 Specific Objectives

The specific objective of the study was:

- To compere muscular strength between rural and urban high school students of south wollo zone?
- To compere BMI between rural and urban high school students of south wollo zone?
- To compere muscular endurance between rural and urban high school students of south wollo zone?
- To compere flexibility between rural and urban high school students of south wollo zone?

1.5 Significance of the Study

- It is helpful for other researchers to use it as reference
- It helps to conclude which area has a good or do well in physical activity and health related physical fitness level, so that it can change certain conscious understanding about urban and rural high school student.
- This study gives awareness about the benefit and importance of physical activity. So that, make them to prevent chronic diseases, to lead a healthy life style and will maintain it and to indicate the exact factors that affect health related physical fitness quality.
- the study might also act as a guide to physical education curriculum developers (influence policy and practice) for designing a curriculum that incorporates PA in the curriculum which would help improve (or preserve) the fitness of students
- This study will also contribute to the general body of knowledge in PA.
- To restore new results of the research finding with other research judgment.
- To examine some of the problems in health related physical fitness quality.

1.6 Delimitations of the Study

The delimitations that involved in this study was:

- ✓ This study is carry out on purposely selected high schools of south wolo zone. There were be group A representative for urban high school students. Group B representative for rural high school students those will be involve in the test. They were representing by both of male and female high school students. so this study was not including all high schools of urban and rural students.

1.7 Limitation of the Study

The study was limited by the fact that there exists paucity of information and local studies therefore research instruments from developed countries were used to strengthen the study. The researcher attempted as much as possible to adapt the research instruments to the local setting, the willingness of students to complete questionnaires for fear of confidentiality of their result might have influenced the validity of the data in the study, there are lacks of experience and money constrains.

1.8 Operational definition of key terms

- **Agility:** is the ability to quickly change body position and make directional changes in body movement. A text book of PE for you define agility is the ability to rapidly and accurately change the direction of the entire body in space 3. ‖ (1999, pate 53) Wayne A.

- **Balance:** is the maintenance of equilibrium while stationary or while moving. (Hoeger & Hoeger, 2016:112).

- **Body composition:** is the proportion of total fat (as it accounts for essential fat and storage fat) in the body based on the individual's total weight (Hoeger & Hoeger, *2016:112*).

- **Cardiorespiratory fitness:** The ability of the body's circulatory and respiratory systems to supply fuel and oxygen during sustained PA (Hoeger & Hoeger, *2016:175*).

- **Coordination:** is the ability to use the sense and body parts in order to perform motor tasks smoothly and accurately. But according to John etal (*1996 page 97*) defined as Coordination involves putting the relevant motor programs in the right order and effectively using the neuron muscular system to produce smoothly an efficient movement.is the ability to use the sense and body parts in order to perform motor tasks smoothly and accurately.

- **Endurance:** -is a health-related component of physical fitness that relates to the muscle's ability to continue to perform without fatigue (USDHHS, *1996).*

- **Flexibility:** The range of motion available at a joint (Morrow Jr *et al., 2011:373*). Flexibility is a property of internal body tissues that determines the ability to move various joints through a full range of motion (Holt, Holt & Pelham, *1995:172*).

- **Cardiorespiratory fitness:** The ability of the body's circulatory and respiratory systems to supply fuel and oxygen during sustained PA (Hoeger & Hoeger, *2016:175*).

- **Power:** it is an explosive strength, is the ability to effectively integrate strength and speed to produce maximum muscular force at a maximum speed.

- **Speed:** is the ability to perform a movement quickly. It is the time takes us to respond to a stimulus. John etal (*1996 page 96*) also state that ―Speed is basically how fast you can move partial your body or the whole of your body, and is measured in meters per second

- **Strength**: The amount of force that is produced with a single maximal effort of the muscle group (Corbin *et al., 2011:160*).

- **Rural Area**: Rural area is referred to as the area under the jurisdiction of Mandal Panchayat having population of less than thousand. (answers.yahoo.com august 20019).

- **Urban Area:** Urban area is generally referred to as the area under the municipal organization of the town having population more than 50 thousand (cber.cba.ua.edu august 20019)

1.9 Organization of the study

This study is organized under five chapters. The first chapter highlights the paper; and why to study. Chapter two reviews related literature to distinguish previously discovered areas to cover the ground for what is to be obtained in this study. Chapter three deals how the research makes, the targets to shot upon, and how the data analyzed. Chapter four result and discussion of the study. The final chapter is to summarize, conclude, and forward suggestion and recommendations based on what is obtained in chapter four, recommendation for further researches.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

2.1 DEFINING PHYSICAL ACTIVITY AND PHYSICAL FITNESS

Physical fitness is the ability to carry out daily tasks with full of energy and alertness without fatigue and tiredness. Cardiovascular endurance, muscular endurance, muscular strength, balancing, flexibility and body composition are the component of physical fitness. (National Academy of Science,2005).

The term PF is defined as "a state or an ability that enables an individual to perform daily activities without undue fatigue" (Freed son et al., 2000: S77; Malina & Katzmarzyk, 2006: S295). PF is a combination of attributes an individual has (due to genetics) or achieves (due to regular PA), and is relative to an individuals' ability to perform PA without excessive fatigue (ACSM, 2014:2). Neither the hereditary contribution or environmental influence, may have as great an effect as what regular PA does on PF (Blair et al., 2001: S379). It is also well known that PF includes various components, which emphasize different facets of health and skill-related performance. Researchers often debate whether PF or PA are more important for health benefits. However, a distinction should be made between the two as each serves a different purpose in people's lives (Blair, Cheng & Holder, 2001: S379; Plowman, 2005:151). By definition, these two elements have different functions and contribute to health differently. Therefore, it is not possible to casually conclude which of the two is more important to health.

PA is defined as any bodily movement produced by the skeletal muscles which results in energy expenditure (Caspersen *et al.*, 1985:126). In most cases, PA is an umbrella term used to describe activities that involve physical exertion which lead to health benefits (Caspersen *et al.*, 1985:126-127). Regular participation in PA also improves quality of life and acts as a protective barrier by lowering the risk of lifestyle-related chronic diseases (as discussed earlier) (Blair *et al.*, 2001: S396; Pate, Oria & Pillsbury, 2012:67; CDC, 2015). Everyone can engage in PA, regardless of an individuals' age or health state, and they should, as it is an integral part of our lives. These activities can range from leisure activities, like gardening or hiking, to more strenuous exercise activities and competitive sport. When applied to children, this includes structured PA or extra-mural activities and unstructured free play, amongst others.

Historically, PF involved three basic components, namely, muscular strength and endurance, cardiorespiratory endurance and motor ability (Malina & Katzmarzyk, 2006: S295). However, the traditional concept of PF has since evolved (Malina, Bouchard & Bar-Or, 2004:216). PF is a multifaceted ability as it can range from every day health-related physical demands to highly specific skill-related capabilities. HRPF creates a link between PF, PA and health as several HRPF components are important determinants of various health outcomes (Blair *et al.*, 2001: S379; Boreham & Riddoch, 2001:924; Corbin *et al.*, 2011:7). Sk ill-related PF refers to agility, balance, coordination, speed, power and reaction time (Caspersen *et al.*, 1985:128). Undoubtedly, both are important components of PF.

HRPF is divided into five components, each of which contributes to a positive health state. The five components are body composition, flexibility, muscular strength, muscular endurance and cardiovascular fitness (Corbin *et al.*, 2011:6). These components affect an individuals' state of functional health as they reduce the risk factors and vulnerability to chronic disease (Gallahue & Ozmun, 1995:264; Mood, Jackson & Morrow, 2007:219). Each of these are independent of each other but may also be integrated as all body functions and systems are involved in the optimal performance of PA (Ruiz, Ortega, Gutierrez, Meusel, Sjöström & Castillo, 2006:270; Corbin *et al.*, 2011:7,9). Table 2.1 depicts the five HRPF components and their corresponding benefits when normal reference performance is maintained.

2.2 Concepts of Physical Fitness

Physical fitness can be defined as the capacity to do physical work within granted levels of performance quantitatively and qualitatively. The quantitative training parameters are health related and skill related components of muscular strength, muscular endurance flexibility and cardiovascular endurance whereas the qualitative training parameters are skill related in nature and include the components of agility, speed, balance, coordination and power. Fitness for living in the house or on the farm or at office or factory or in work places or in any service implies freedom from disease, enough strength, endurance and other abilities to meet the demands of daily living. Doing physical activity everyday contributes to optimum health and quality of life. Life styles can be changed to improve health and fitness through daily exercises. Physical fitness is a set of attributes that people have or achieve, being physically fit has been defined as ‘’the ability to carry out daily tasks with vigor and alertness without undue fatigue and with ample energy to enjoy leisure-time pursuits and to meet unforeseen emergencies (Caspersen et al., 1985).

Physical fitness involves the integrated and efficient performance of all the major systems of the body, including the heart and lungs, the skeleton, the muscles, and the brain. The brain is an essential element, as it learns to control the muscles that move the bones, as well as controlling the heart and lungs to provide energy for the working muscles. Fitness also influences our psychological well-being, including mental alertness and emotional stability, because what we do with our bodies also affects our minds. Physical fitness is an individual condition that varies from person to person. It is influenced by factors such as age, gender, heredity, personal health habits, amount and level of exercise, and eating practices. Making physical fitness a priority is important for a long and healthy life. (Manitoba Educational, Citizenship and Youth 2004).

2.2.1Components of Physical Fitness

Physical Fitness is referring to a condition in which an individual has enough energy to avoid fatigues and enjoy life. Physical fitness is divided into health and skill related physical fitness. Skill - related physical fitness is fitness types which enhance one's performance in sport settings. Health - related physical fitness is the ability to become and stay physically healthy. It also focuses on factors that promote optimum health and prevent the onset of disease and problems associated with in activity (National Association for Sport and Physical Education (NASPE, 2009)

2.2.1.1 Skill-related Physical Fitness Components

- ✓ **Agility: -** is the ability to quickly change body position and make directional changes in body movement. A text book of PE for you define agility is the ―ability to rapidly and accurately change the direction of the entire body in space 3. ‖ (1999, 53) Wayne A. Payne and Dale B. Bahn define‖ Agility is the ability to move quickly with frequent direction position, enhance your performance in a in variety of activities. (1989, page 71). This is the combination of speed and coordination. It allows you to efficiently change direction and body position at speed (1999,53) Wayne A
- ✓ **Balance: -** is the maintenance of equilibrium while stationary or while moving. The harmonious development of physical, mental and spiritual aspects a person. Balance is the ability to maintain equilibrium in other words, something is balanced when is seems as something natural and simple to perform, or is balance when its center of gravity is over its area of support.
- ✓ **Coordination: -** is the ability to use the sense and body parts in order to perform motor tasks smoothly and accurately. But according to John etal (*1996 page 97*) defined as

Coordination involves putting the relevant motor programs in the right order and effectively using the neuron muscular system to produce smoothly an efficient movement. Hence, coordination is the ability to integrate sensor and motor systems to produce efficient movement.

- ✓ **Power: -** is the ability to transfer energy swiftly in to force. And also it is an explosive strength, is the ability to effectively integrate strength and speed to produce maximum muscular force at a maximum speed. It is the rate at which energy is expended or work is done. Then J.shorkey(*1997 page 145*) define power ―work divide by time, or the rate of doing work if one can perform the same work better than the other with in the same time interval, then we have got a better power.

- ✓ **Speed: -** is the ability to perform a movement quickly. It is the time takes us to respond to a stimulus. John etal (1996 page 96) also state that ―Speed is basically how fast you can move partial your body or the whole of your body, and is measured in meters per second. Therefore, speed is the rate of movement and often refers to the ability to move rapidly and it is an important factor in all explosive sports and activities that require sudden changes in space.

2.2.1.2 Health-related physical fitness

Health-related physical fitness can be defined as an integrated measure of the whole body functioning, be it skeletomuscular, cardiorespiratory, hamate circulatory, psych neurological and endocrine-metabolic, that are involved in the performance of daily PA (Esmaeiade & Ebadollahzadeh, 2012:105).

- ✓ **Cardiorespiratory fitness**

Cardiorespiratory fitness (CRF) can be defined as the health-related component of physical fitness with the ability of the circulatory, respiratory, and muscular systems to supply oxygen efficiently and for a long period of time during a sustained PA (Lee *et al*., 2010:27). Furthermore, CRF is usually expressed in metabolic equivalents (METs) or maximal oxygen uptake (VO2max) measured by exercise tests such as a treadmill or cycle ergometer. According to the ACSM (2013), CRF might not be a quick detector and consistently reliable means of measuring habitual PA, but may be a comparatively low-cost and a necessary health indicator for both symptomatic and asymptomatic patients in clinical practice (Myers *et al.,* 2004: 912-913). Individuals with higher fitness levels are able to sustain higher intensity PA for longer periods compared to their less fit

counterparts (Beam & Adams, 2011:2). Physical activity patterns, genetics, and other factors such as age, gender, medical status, and selected health-related lifestyle behaviours are the contributing factors to an individual‟s CRF level (Pahkala, *2009:14*).

✓ **Flexibility**

It is a health-related component of physical fitness that relates to the range of motion available at a joint (USDHHS, *1996*). Some experts specify that flexibility requires range of motion without discomfort or pain (Howley& Franks, *1997*). Flexibility is specific to each joint of the body, thus there is no general measurement of flexibility as there is for cardiovascular fitness. Flexibility is typically measured in the lab using measurement devices such as a goniometric, flex meter and in the field with test exercises such as the sit and reach, and the zipper.

✓ **Strength**

The requirement for a particular strength quality for a team sports player will depend on the typical demands placed upon them during competition and also the natural of these sports (Gamble, 2010). Muscular strength is generally acknowledged as being important factor in sports that are dominated by speed such as soccer and rugby union, which relates with a large endurance component. Given the importance of muscular strength in so many sports, the coach and player must understand how the development of strength can affect sport performance and need to understand the principles associated with resistance training to effectively use resistance training to enhance performance (Bompa & Haff, 2009).

- **Definition and structure of strength**

The term strength will be employed to identify the maximal force or torque that can be developed by the muscles performing a particular joint movement (e.g. elbow flexion, knee extension). However, the muscles may perform at maximal effort as either isometric, concentric or eccentric actions and the two dynamic actions may be performed at a wide range of velocities (Komi, 2003). Therefore, strength is not the result of a measurement performed under a single set of conditions because of the number of variables or conditions involved strength of a muscle or muscle group, strength must be defined as the maximal force a muscle or muscle group that can generate at a specified or determined velocity. Also strength is the ability to develop force against an unyielding resistance in a single contraction of unlimited duration (Maud & Foster, 2006).

Strength is the maximal force produced by a muscle or muscles at a given speed. Power is the product of force (strength) and velocity (speed) (Hamill & Knutzen, 2009). The parameter that

describes a force being applied over a given distance (work performed) in a given time is power. For the purpose of this, power will be defined as force x distance/time (also work/time) and maximal power (Pmax) will be defined as the highest average power output during the concentric phase of a muscular contraction (Baker, 2001). Some definitions of strength are as follows, (Baechle & Earle, 2008) has defined strength as "Strength is the maximal force that a muscle or muscle group can generate at a specified velocity" and (Bompa & Haff, 2009) as a maximal force or torque (rotational force) a muscle or muscle group that can be generated. (Dick, 2007; Weineck, 2004) divided strength into four types:

- Maximal strength
- Speed strength
- Reactive strength
- Endurance strength

- **Maximal strength**

is the highest level of force that can possibly generated of a player? Its importance will vary between sports but this relates more to the length of the maximal strength training phase than whether it should be included or not. The greater a player's maximal strength to begin with, the more of it can be converted into sport-specific strength endurance or explosive power (Bompa & Haff, 2009). As same as has (Dick, 2007) defined maximum strength as the greatest force that the neuromuscular system is capable of applying in a single maximum voluntary contraction.

- **Speed strength**

ability defined by (Weineck, 2004) as a component of the explosive power and results from the slope values of a force-time curve. From the three components maximum power, speed and explosive force, the speed strength ability will be formed in muscle contractions. (Martin, 1999) refers that speed strength, is the ability to quickly make optimal force. The rapid force is composed as a complex property of the component strength and speed.

- **Reactive strength**

concerns the coupling of eccentric and concentric muscle actions, and as such comprises both eccentric and concentric speed strength qualities, also in addition to stretch shorting cycle components (Gamble, 2010). Reactive strength defined by (Bompa & Haff, 2009) as the ability to change quickly from an eccentric to a concentric contraction.

- **Endurance strength**

Is dependent on the components of strength and endurance and can be defined as the maximum force dependent on the fatigue resistance to extended repetitive stress under static or dynamic muscle work (Dick, 2007). The application of endurance strength is the ability to counter the fatigue produced by the strength load components of an activity over a prolonged period of time (Bompa & Haff, 2009). Maximum strength is the principle component for field team sports such soccer and rugby union. Player‟s body weight and the performance activities in game are closely correlated together. (Dick, 2007) demonstrated the difference between absolute and relative strength and suggested that, heavy players can in absolute terms achieve greater strength expression than lighter players. The maximum force that player can express, regardless of body weight, is therefore referred to as absolute strength. On other hand, the maximum force that player can express in relation to body weight is known as relative strength.

Hoff (2005) stated that strength testing should take place for the upper and lower body and should be evaluated using a 1 RM test of half squat and bench press. This gives an indication of the greatest amount of weight an individual can lift for each exercise, and also provides information on the athletes training loads calculated as a percentage of the 1 RM. Therefore, the understanding of strength importance for field team players such as soccer and rugby union could give coaches overview about strength training intensity. Thus, the next part demonstrates the benefits of strength as an important factor for soccer and rugby union.

✓ **Endurance**

Endurance as a high level of aerobic fitness characteristics in field team sports helps to maintain the work rates related with team play, supporting team matches, running off the ball and chasing opponent players from other team to get back possession (Carling, et al., 2009). Physical fitness characteristics in field team sports as strength and power, which related strongly to game activities that involves acceleration, sprinting and jumping share importance with endurance in explaining differences in physical fitness characteristics within soccer and rugby players performance. Therefore, the understanding of aerobic endurance as an important factor in field team sport matches will be demonstrates in this study. In this section in thesis, it will be presented the important aerobic endurance factors study as VO 2maxand match covered distance in soccer and rugby players.

- **Definition and structure of endurance**

In general, aerobic endurance is the amount of oxygen intake during exercise. This definition isn‟t enough to define aerobic endurance exactly. (Bompa & Haff, 2009) suggested that endurance could be classified as several ways such as aerobic endurance, low intensity exercise endurance or define as the ability that allow a player to perform activities continually for a long duration. Endurance is directly or indirectly of high importance in all sports. It is however not easy to define endurance, but there is agreement regarding the following aspects endurance: it related to doing work for a long time of period, it relates to working under fatigue conditions, it involves a large number of muscles and it involves work efficiency. (Heyward, 2006) defines endurance as "the ability of the heart, lungs, and circulatory system to supply oxygen and nutrients to working muscles efficiently". Schnabel, et al., (2003); Thiess & Schnabel, (1995) also defines endurance as the resistance ability to fatigue, (Shephard & Astrand, 2000) have also used to the concept of ability to resist fatigue for defining endurance as "the ability to do sports movements, with the desired quality and speed, under conditions of fatigue". In context of field sports has (Mahler, 1995) defined endurance as the ability to perform dynamic exercises that involving large muscle groups at moderate to high intensity for extended periods.

- **Heart rate**

In response to physical activity, HR increases in a predictable manner (Boulay et al., 1997). In fact, the relationship between exercise intensity and HR is an extremely linear one-the greater the intensity, the higher the HR, with the relationship becoming more curvilinear (HR begins to plateau) at very high intensities (Wenger & Bell, 1986). Because of its predictability, one can use HR to prescribe running intensities. It has been reported that the HR observed at slightly below the ventilator threshold is a better indicator of the exercise intensity that can be sustained for prolonged periods than other physiological measures such as blood lactate concentration, work output, ventilation (liters of air breathed in or out per minute), and volume of expired carbon dioxide (Boulay, et al., 1997). This is good news for the coach since determining athletes' heart rates is obvious ly much easier than determining their blood lactate concentrations or VO2 max.

- **The Importance of Maximal Heart Rate**

Measurement of heart rate is routinely used to assess the response of the heart to exercise, or the recovery from exercise, as well as to prescribe exercise intensities. Given that the increase in heart rate during incremental exercise mirrors the increase in cardiac output, maximal heart rate is often

interpreted as the upper ceiling for an increase in central cardiovascular function. Indeed, research for the last 100 years has demonstrated that heart rate does in fact have a maximal value; one that cannot be surpassed despite continued increases in exercise intensity or training adaptations (Karvonen et al., 1957). HR is considered the standard for estimating exercise training intensity in the field based on its linear relationship to VO2 max. The recommendations of the American College of Sports Medicine (ACSM) for moderate to hard relative exercise training intensities for cardio respiratory fitness based on HR are 55%-90% of maximum heart rate (HRmax) or 40%-85% of heart rate reserve

- ✓ **Body composition**

Body Composition: -is a health-related component of physical fitness that relates to the relative amounts of muscle, fat, bone and other vital parts of the body (USDHHS, 1996). Body composition is affected by body weight and interconnected with muscles, fat, bone, and other important body tissues. Sometimes though, this element of a larger whole is reduced to fat and fat-free mass, and assessed as a body fat percentage and total body weight (in kilograms) (Lindsay *et al., 2013:2*).

- **BMI and physical performance variables in adolescents**

Body composition refers to the components that amalgamate to form an individual's total body weight. There are 50 elements which combine to constitute 100,000 chemical components, nearly 200 cell types, and 4 main body tissues. The major contribution towards body weight is by water/fluid, bone, muscle, and adipose content. Also included are skin, organs, and neural tissue. Typically, in simple body composition assessment models, the lean components (e.g., fluid, bone and muscle) are combined and categorised into the fat-free mass (FFM), which accounts for about 80-85% and 70-85%, of an individual's body weight on average (in boys and girls, respectively) depending on Athe age. Average fat content is 15-20% and 15-30%, in boys and girls respectively (Laurson *et al*., 2011). Adequate functioning of the musculo-skeletal system has pre-requisites such as the muscles be able to produce torque or force (assessed as strength), resist fatigue (assessed as muscular endurance), and have sufficient full range of motion around joints (measured as flexibility). Research has provided ample evidence for children/adolescents as well as adults, that adequate musculoskeletal fitness is positively associated with overall health status and reduced risk for disability and chronic disease (Payne *et al*., 2000; Warburton *et al*., 2006; Westcott, 2012) and mortality in adults.

Increased levels of muscular strength and muscular endurance and/or adaptations as a result of resistance training positively affect or predict long-term changes in the body composition (Hasselstrøm *et al*., 2002; Ruiz *et al*., 2009; Twisk *et al*., 2000; Warburton *et al*., 2001b; Warburton *et al*., 2006), bone health (Boreham and McKay, 2011; Warburton *et al*., 2001a and b) and cardiovascular risk factors (Warburton *et al*., 2001a; Barnekow-Bergkvist *et al*., 2001; Janz, *et al*., 2002; Garcia-Artero *et al*., 2007; Ruiz *et al*., 2008; Ortega *et al*., 2008b; Artero *et al*., 2012; Magnussen *et al*., 2012; Martinez-Gomez *et al*., 2012).

Researchers require accurate measures of youth fitness to (a) predict the association between various health outcomes and fitness levels (b) evaluate the efficacy of training programs aimed at increasing fitness levels and (c) quantify current levels of fitness in a given population under investigation. Aerobic capacity, muscle strength and endurance, flexibility and percent body fat, all these variables are important parameters to assess the level of fitness.

Several authors have reported negative influence of body composition on various health related fitness, including the PACER test (Lloyd *et al*., 2003) and mile run and walk tests (Cureton *et al*., 1975; Slaughter *et al*., 1977; Cureton *et al*., 1977 and 1995; Pate *et al*., 1989; Cureton *et al*., 1991; Rowland *et al*., 1999) the tests of aerobic capacity, the curl-up tests used to assess the abdominal muscle strength and endurance (Lloyd *et al*., 2003 and Pate *et al*., 1989), and the pull-up tests and push-up tests of upper-body strength and endurance (Cureton *et al*., 1975; Pate *et al*., 1989; Woods *et al*, 1992 and Lloyd *et al*., 2003).

Lloyd *et al*. (2003) conducted a study on girls and boys (10-12 years of age) and demonstrated that adjusting scores for the influence of body composition (measured by the sum of skinfolds) altered the existing classification of fitness as being above or below the criterion-referenced standard in girls (5%, 18%, 13%) and boys (23%, 18%, 21%) on the PACER, the curl-up, and on the push-up respectively. Adjustment of scores in this fashion affected adolescents with both lower and higher skinfolds than normal BMI adolescents i.e. a resultant decreased score for individuals with lower skinfolds and increased score for individuals with higher skinfolds in comparison to the performance scores predicted while considering a mean level of skinfold thickness. It could be summarized from these studies that overweight and obese children and adolescents performed poorly on these tests than healthy weight adolescents and youth (Kim *et al*., 2005 and Joshi *et al*., 2012).

- **Consequences of obesity in adolescents**

Physiological consequences

During the adolescent years, considerable changes in body composition, insulin sensitivity and adipocyte concentration are experienced. There is increase in both lean body mass and fat mass in puberty with girls exhibiting higher changes in fat mass as compared to boys (Maynard *et al.*, 2001). Obese girls exhibit early pubertal maturation as compared to non-obese girls of same age and tend to have greater BMIs and percent body fat at the time of menarche (Kimm *et al*., 2002). Childhood obesity itself poses as a major health concern, besides being associated with adult obesity (Dietz, 1998). There is ample research evidence supporting strong correlation between pediatric and adolescent obesity and adult obesity which increases with the child's age independent of the time duration the child has remained obese (Guo and Chumela, 1999; Whitaker *et al*., 1997; Deshmukh-Taskar *et al*., 2006). Also, overweight adolescents are more likely to turn into overweight adults (Guo and Chumlea, 1999) irrespective of the timing of puberty implying that adolescent obesity is the determining factor for both adult obesity as well as age of onset of puberty (Freedman *et al*., 2003) or if they have either one or both obese parents (Whitaker *et al*., 1997). Besides the obvious accumulation of excessive body fat, the obese child demonstrates an increase in lean body mass and hastened sexual development and is subjected to acceleration of linear growth and enhanced skeletal maturation (Forbes, 1977); evident from an expanded circulatory system (increased plasma volume, hypertrophy of myocardial fibres along with cardiac chamber enlargement) which reflects this somatic growth.

Psychosocial consequences

Medical consequences of obesity have been well documented but equally pernicious are the psycho-social corollaries of obesity in adolescents. Obese children are easy target of early and systematic discrimination. As they mature, the consequent effects of discrimination become even more culture-bound and insidious. Anti-obese attitudes are commonly observed across many cultures especially Western culture resulting in discriminatory practices at various levels (Yuker *et al.*, 1995). Obese population is psychologically heterogeneous with certain individuals exhibiting greater psychological problems as compared to others. It has been reported that as compared to non-binge-eating obese individuals, obese individuals with binge-eating-disorder (BED) experienced greater anxiety, obsessive-compulsive disorder, depression, psychoticism, along with greater somatization and hostility (Smith *et al*., 1998).

Studies investigating associations between BMI and depression across both the genders indicated that BMI and depression were gender dependent (Carpenter *et al.*, 2000). Research conducted by Istanu *et al*. (1992), concluded that there existed a positive correlation between BMI and depression in females, but not in males implying that being obese, females were more affected as compared to males. Research conducted by Sallade *et al*. (1973), Allon *et al.* (1979), Strauss *et al*. (1985), French *et al*. (1995), Wardle (2005) and Wang *et al*. (2008) indicated a negative association between BMI and self-esteem. Wang *et al*. (2009) demonstrated that body fatness and self-esteem were inversely related in adolescents and highlighted that excess percent body fat preceded the development of low self-esteem, over a 4-year period. Researchers have proposed that both teasing by peers and especially family members and weight related social stigmatization might lead to development of low self-esteem in overweight and obese children (Musher-Eizenman *et al*., 2009)

2.2.1.2.1The importance of Improving Health-Related Fitness Components

Physical fitness can also be thought of as an integrated measure of most, if not all, the body functions involved in the performance of daily PA and/or physical exercise (Ortega et al., *2008*). Health related physical fitness includes cardio respiratory endurance, muscular strength and endurance, body composition and flexibility (Howley, *2001*).

Childhood and adolescence are important stages of life, since remarkable physiological and psychological changes take place at these ages. Furthermore, lifestyles and healthy/unhealthy behaviors are formed during these years, which may influence adult behavior and health status. Low physical fitness in children has been associated with impaired health indicators such as increased body fatness (Dencker et al., 2006) and high abdominal adiposity (Ortega et al., 2007; Brunet et al., 2007), several cardiovascular disease risk factors (Buchheit et al., 2007; Thomas et al., 2003), hypertension (Katzmarzyk et al., 2001; Ruiz et al., 2006) and low PA (Dencker et al., 2006). Therefore, it is important to promote high levels of fitness in children and youth. A number of studies have drawn attention to increases in fatness (Olds and Harten, 2001) and declines in aerobic fitness (Tomkinson et al., 2003) in school children. The implications of decreasing fitness levels in children are considerable. Children are losing the metabolic effects of fitness that might protect them from excessive weight gain as well as other metabolic ill health risk factors (Stratton et al., 2007). The risks of poor fitness and obesity are cumulative and may be carried from childhood to adulthood (Eriksson et al., 2003). This situation is extremely worrying for future public health. Given that fitness is an important component of metabolic health (Eisenmann et al.,

2005) and a strong independent predictor of premature death (Blair et al., 1996), examining the fitness levels of children could be useful for stimulating interventions to improve fitness among the children. Physical fitness is not just a help to sport and physical education, it is also a major factor in leading a happier and fuller life (Rudolf et al., 2001; Grund et al., 2001). For the individual child, being fit can help to develop a positive attitude enabling the child to achieve a self-awareness of their physical state and thus become more motivated to maintain or improve their fitness (Wright et al., 2007).

2.2.1.2.2 Factors affecting health-related physical fitness

Health-related physical fitness is the ability to perform one's normal daily routine and still be able to attend to unforeseen emergencies without undue fatigue (Aboshkair *et al*., 2012:202). In children and adolescents, there could be many factors which stand as an obstacle to good health-related physical fitness. According to Active Living Research (2007), school is the best environment for the provision of daily PA as it provides the opportunity to teach the benefits of regular PA to health, which leads to building the necessary skills and attitudes that support active lifestyles in children. Furthermore, achieving the full benefit of Physical Education (PE) in a well-organized manner through effective teaching programs should be the priority of the school system. Regular participation in school PE has been shown to have a compensatory relationship with increasing children‟s PA level (Morgan *et al.,* 2007:411-412) by providing students with an adequate percentage of recommended daily PA. This is a major objective of PE, and it relies on the quality and efficiency of teachers. Several factors such as body size, maturity status, growth status, nutritional status, time spent performing PA, and family income also greatly affect children‟s health-related physical fitness (Boone *et al.,* 2007:1-2; Katzmarzyk *et al.,* 2013: 6-10). It has also been established that children who differ in maturity status also differ in body size, physique, and physical performance which equally have a bearing on their health-related physical fitness (Aboshkair*et al*., 2012:203).

Genetically, putting individual difference as a consideration is important because it has an effect on the PA, fitness and health paradigm (Bouchard, 1993:6). For example, it has been established that genetic differences are responsible for the most individual differences due to their responses to regular exercise programs which are targeted at improving health-related fitness components and alleviating the different types of risk factors of chronic diseases of lifestyle, especially for cardiovascular disease and diabetes (Bouchard, 1993:6).

2.3 Physical Activity

According to Caspersen *et al.* (1985: 126-127), PA is defined as any bodily movement produced by skeletal muscles that results in energy expenditure, and is positively correlated with physical fitness, e.g. walking, jogging, cycling, swimming, domestic chores and gardening. PA level can be categorized as low, moderate or high, based on the amount of calories expended by an individual during the activity period, the weight of the body and the amount of oxygen consumed (ACSM, 2013). Furthermore, it is recommended that people should engage in moderate levels of PA for at least 30 minutes per day, three times a week or take at least 10,000 step counts as a result of walking from one place to another per day for health and wellness in order to improve the quality of life (Toriola & Monyeki, 2012:797). Despite this recommendation, people's turnout regarding the involvement in PA or exercise has been very low in many parts of the world, if not the entire world (CDC, 2009).

In addition to the role it plays in the prevention of overweight and obesity and the exposure to chronic diseases of lifestyle, the importance of PA to the healthy growth and development of children and adolescents cannot be over-emphasized (Hills *et al*., 2011:866). In addition, the use of automated machines and advances in modern technology (e.g. prolonged TV viewing) has drastically reduced the level of children's involvement in PA in terms of energy expenditure (Nelson *et al.,* 2006: 1631; Rivera *et al.,* 2009: 278-279; Esmaeialzadeh & Siahkouhian, 2011: 624). This has raised much concern as low PA does not give youth the opportunity to comply with recommended PA guidelines which results in poor health-related fitness levels and creates imbalances in their body composition (Nelson *et al*., 2006: 1627-1628; Rey-Lopez *et al*., 2008: 244-247).

2.3.1 The physical health benefits of sport participation

The physical health benefits of sport have been widely documented. In a review of youth sport, Blom et al (2013) identified a range of benefits which include improved bone mineral density, increased strength, stamina, flexibility and endurance, as well as enhanced functioning of cardio-respiratory and muscular systems, reduced risk of chronic illnesses and favourable changes to body composition.

2.3.1.1 Chronic diseases

It is proposed that a significant benefit of sports participation is the decreased risk of developing chronic diseases. While young people do not usually suffer from chronic illnesses such as heart disease, diabetes or osteoporosis, risk factors can begin to develop early in life (US Department of Health and Human Services, 2008). A report entitled "Physical Activity Guidelines for Americans" which was published by the US Department of Health and Human Services in 2008 suggests that regular physical activity reduces the likelihood of the risk factors developing and therefore increases the chances of children remaining healthy as adults (US Department of Health and Human Services, 2008). McMurray and Andersen (2010) corroborate these claims by also implying that sport decreases the risk of developing cardiovascular disease and other chronic illnesses. However, there does not appear to be any tangible evidence surrounding this topic. Future research needs to focus on providing sufficient figures on this relationship. Moreover, longitudinal studies would be highly beneficial in explaining the link and causality further.

2.3.1.2 Obesity

Sports participation has also been associated with a reduced risk of obesity (Ness et al, 2007). The discussion concerning the relationship between sport and obesity has become more prominent over the last two decades as the worldwide crisis of obesity has emerged and escalated. The 2011 Health Survey for England report indicated that approximately 3 in 10 boys and girls aged 2 to 15 were classified as overweight (31%) or obese (28%) (The Health and Social Care Information Centre, 2012). The Foresight Report, produced by Butland et al (2007) estimated the projected 2050 English obesity rates to be 26% for males and females under the age of 20, 14% by 2025, and 10% by 2015. Thus, it is unsurprising that a variety of methods are being introduced to reduce the likelihood of this obesity epidemic.

Many individuals, organisations and governmental departments suggest that physical activity and sport has the potential to reduce body fat, and therefore decrease the risk of obesity (Burke et al, 2006; US Department of Health and Human Services, 2008). Burke et al (2006) found that greater fitness amongst 602 Australian 11-14 year olds was associated with a reduced risk of obesity. Moreover, a study by Dencker et al (2006) on the effects of physical activity on the percentage of body fat of 248 Swedish 8-11 year olds revealed that there is a strong cross-sectional association between physical activity and obesity. Additionally, this appears to be stronger for the higher intensity activity (Dencker et al, 2006). Ness et al (2007) found similar findings in a cross

sectional analysis on 5,500 12-year-old children who were enrolled into the English Avon Longitudinal Study of Parents and Children. The results of this study illustrated that moderate to vigorous physical activity reduced fat mass, and thus, reduced the risk of obesity. A further study by Pallan et al (2013) identified a small but significant association between the inter-school variation in body mass index in English primary school children and school-based physical activity. The results suggest that the time devoted to PE and school in sport may influence weight status (Pallan et al, 2013). Although this study investigates primary school children in year six, the findings have partial significance to the review as it demonstrates that there are already issues with obesity prior to children attending secondary school.

A criticism of these results however, is the presence of weak or modest associations between physical activity participation and reductions in obesity, which may be the result of the multi-causality of obesity; numerous factors contribute to obesity, including diet and family life. Therefore, changes in these areas are also needed to accompany alterations in the time spent exercising to ensure that significant reductions in obesity and the risk of obesity are made (Stouffer & Dorman, 1999; Verduin et al, 2005) Following on from this, the impact of sports participation on the diet of young people will now be discussed.

2.3.1.3 Diet

Meyer et al (2000) suggested that a healthy diet is essential for the overall health of children during their vital years of growth and development. Following the onset of the obesity epidemic, the significance of a healthy diet has also been connected to a reduced risk of obesity.

Several researchers have begun observing the connection between sports participation and diet in young people. Cavadini et al (2000), Croll et al (2006), Ottevaere et al (2011) and Tomlin et al (2013) have all conducted studies surrounding this association and have concluded that adolescents who participate in sport have a healthier diet than their non-sporting peers. Tomlin et al (2013) observed the dietary patterns of 1421 Canadian 10-11 year olds. Through the use of two questionnaires and a 24-hour dietary recall, the sports participation levels and food intake of the participants were measured. The results indicated that those involved in organised sporting activity consume more calories, fat, fibre, fruit, non-flavoured milk and vegetables than those who do not participate in sport or physical activity. It was concluded that although the sporting group of participants consumed more calories, they have healthier diets and lower BMI's in comparison to their non-athletic counterparts.

Jago et al (2004) conducted a study on the relationship between physical activity and diet and found some association between the variables, but the results varied in accordance with gender. The study utilised activity monitors and dietary recalls to record the food intake and mean time of moderate to vigorous activity completed by 210 8-10-year-old African-American girls. Whilst they found that increased physical activity was related to lower fat intake and lower BMI, it was also associated with higher carbohydrate intake.

While the above studies have found associations between the variables, there are research papers available which indicate that there is no relationship between sport and diet. Vissers et al (2013) observed 4 days of food diaries and 7 days of accelerometer for 1317 British children aged 9 and 10. No obvious association was present between diet and physical activity; there were no significant associations for females, and although there were some associations found for males, these were relatively weak. Thus, it was concluded that there was no relationship between the variables. Similarly, McNaughton et al (2008) could not find a consistent relationship between physical activity and the dietary patterns of 764 Australian 12-18 year olds when analysing the results of the Australian National Nutrition Survey, with only their high sugar and fat consumption patterns related with high levels of physical activity. Although these two studies explored the association for different demographics and used different methods of data collection, the results appear to be the same.

Nonetheless, the results of the research papers on this topic appear to be mixed and articulate different information. Williams (2008) observed that whilst the results of the studies surrounding this topic are mixed, the dietary consumption of young athletes are deemed to be lacking in carbohydrates, energy and numerous micronutrients, particularly calcium, iron, folate and zinc, yet intake of fat is in excess (Beals, 2002; Christensen et al, 2005; Iglesias-Gutierrez et al, 2005; Lopez-Valera et al, 2000; Papa dopolou et al, 2002; Ziegler et al, 2002). Similarly, Tomlin et al (2013) noted that less than 50% of the children in the sporting and non-sporting groups of this study met the recommended guidelines in regards to fruit and vegetables, and the sport group ingested more fat than that which is recommended. Thus, Williams (2008) claims that most studies indicate that many young athletes do not have adequate or healthy diets.

A considerable limitation of the research on this topic involved the issue of self-reporting dietary intake, whether this be through food frequency questionnaires or food diaries (Vissers et al, 2013). Due to the nature of the topic, participants may under-report or over-report consumption of certain foods, thus potentially affecting the accuracy, reliability and validity of the findings and conclusions (Vissers et al, 2013).

2.3.1.4 Diabetes

The rates of diabetes among young people are increasingly becoming a cause for concern in England (Townsend et al, 2013). A survey conducted by the Royal College of Paediatrics and Child Health determined that in 2009 there were 22,783 young people aged 0-17 living in England with diabetes (approximately 97% of these had type 1 diabetes, and 3% had type 2 diabetes). These are the most recent statistics currently available. Diabetes has been associated with low physical activity levels as well as increased obesity rates (American Diabetes Association, 2007; NICE, 2011; Rocchini, 1999). Whilst the data concerning the impact sport or physical activity has on the prevention of diabetes is prevalent with regards to adults, this information for young people is scarce. However, one study conducted by Thomas et al (2009) explored the relationship between physical activity and intravenous glucose tolerance (*K*g) and resting energy expenditure (REE) in 32 American adolescents aged 12-18. The results illustrated that physical activity is significantly and positively associated with both *K*g and REE; as the levels of physical activity increased, the *K*g and REE simultaneously rose. Thus, it was concluded physical activity can be used to assist with the prevention of diabetes in young people.

2.3.1.5 Bone health

Another physical health benefit of youth sport appears to be enhanced skeletal and bone health (Eime et al, 2013). McKay et al (2005) examined the effects of a daily, three minute, physical activity intervention on the changes in bone mass and structure in American school children. The results suggested that this exercise did improve bone mass at the weight bearing proximal femur in early pubertal young people (McKay et al, 2005). As this study investigated the effects of an extremely short amount of time exercising, it would be interesting to observe the results of a longer exercise time.

2.3.1.6 Summary of the physical benefits

It is clear that there is a range of physical health benefits of sports participation for children, which not only enhance the physical wellbeing of the individuals involved through improving the health of their bones, but also potentially contribute to extending or saving their lives, through the decreased risk of chronic diseases and obesity. It is proposed that children also benefit from participation in sport in a psychological sense. Thus, the psychological benefits of involvement in sport will now be discussed.

2.3.2 Influencing Factors for health benefit of physical activity

2.3.2.1 Factors that Affecting Physical Fitness Program

Factors that affecting physical fitness programs are stated by many scholars in different ways. Then, Percival etal (*1992 page 91*) explained to develop safe effective, health enhancing exercise program that gaits everybody means looking at a member of factors such as age, current health, status, personal interest, personality type, finance, the climate you live in and the availability of exercise facilities and other that we need to take into account. There are two major factors that influence each of the health related fitness components: physical activity and nutrition.
Education in both areas is critical in helping an individual to develop overall physical health. The benefits of physical activity have been viewed as important in our society for many years.

However, it was not until the second half of this past century that evidence from a scientific standpoint began to support these beliefs (Cooper, 1991, 1999). There is an accumulating body of evidence to support the fact that young children are becoming less physically active and more overweight and obese. For example, the Centers for Disease Control (CDC; 2000) reported that physical inactivity has contributed to the 100% increase in the prevalence of childhood obesity in the United States since 1980. In addition to issues regarding obesity, many studies on physical activity have shown that the body responds to exercise in ways that have positive effects on the cardiovascular, respiratory, endocrine, and musculoskeletal systems. More specifically, physical benefits of exercise such as increased muscle strength, range of motion, flexibility, posture, and endurance, all promote self-sufficiency and decrease feelings of depression, dependence, and lack of control. Regular participation in physical activity also appears to reduce anxiety, improve mood, and enhance an individual ‘s ability to perform daily tasks. Also, emerging research in animals and humans alike suggest that physical exercise may boost brain function, improve mood, and otherwise increase the capacity for learning (Kong, *1999*).

Proper nutrition is the other major factor that influences physical development. Many adults have been taught incorrect information about nutrition and are teaching this to their children (Willett, Skerrett, &Giovannucci, 2001). For the well-being of our children, adults need to become more aware of what proper nutrition encompasses and attempt to instill proper nutritional habits in children from an early age. Unfortunately, some of the information coming from respected sources is inaccurate (Willett, 2001). For example, the Dietary Guidelines for Americans published by the United States Department of Agriculture (*1995*) suggests that the daily diet should contain 6 to 11 servings of foods high in carbohydrates such as bread, cereal, rice, and pasta. However, the suggestions from faculty at the Harvard School of Public Health (Willett, et al.) propose these foods should be used sparingly. While both suggest eating healthy foods such as grain products, fruits and vegetables, low-fat dairy products, beans, lean meat, poultry, fish, or nuts, the recommended portions of each are often quite different (see Willett, 2001 for a detailed comparison).

It is also important that adults teach children healthy eating by example. Children should not only hear educators and other adults telling them how they should eat, but they should also see those around them eating these same healthy foods. There is a caveat in the recommendations from experts: dietary guidelines are intended for children over the age of two years. Infants from birth to the age of two need a higher amount of fat intake in their diet because of their rapid growth rate. The American Heart Association (2004) states that beginning around the age of two, toddlers can be moved on to the recommended dietary guidelines recommended for adults. Parents should consult their family pediatrician for more specific dietary guidelines for an infant. Staying up-to date on current information regarding nutrition and following recommended dietary guidelines are important factors in being able to help properly educate our youth.

2.3.3 Physical activity recommendations for children and adolescents

In the 1940s, PA was considered to be a cause of heart attack, and heart attack patients were advised to stay in bed. Then high intensity PA was advocated as the means of staying healthy. Since the 1970s, research has shown that moderate-intensity PA is beneficial for health, and the accumulation of moderate activity for 30 minutes on most, or preferably all, days of the week is recommended as an effective cardiovascular disease (CVD) prevention measure (Report of a Joint FAO/WHO Expert Consultation) (WHO, 2003a:10).

The consensus statements recommended for adolescents (aged 11 to 21 years) contain two basic guidelines (Corbin & Pangrazi, 2001:43).

- **Guideline 1:** All adolescents should be physically active daily, or nearly every day [30 to 60 minutes], as part of play, games, sport, work, transportation, recreation, PE, or planned exercise, in the context of family, school, and community activities.

- **Guideline 2:** Adolescents should engage in three or more sessions per week of activities that last 20 minutes or more and require moderate to vigorous levels of exertion. In contrast to pre-adolescent children, the consensus is that adolescents should participate in some continuous and vigorous activity. The first guideline is regarded as a priority. Participation in 30 to 60 minutes of daily activity is a reasonable, even minimal, goal for sedentary youth. Beyond this, Guideline 2 is a desirable goal. The consensus statement includes activities such as brisk walking, jogging, stair climbing, basketball, racquet sports, soccer, dance, swimming laps, skating, strength (resistance training), lawn mowing, and cycling as some examples of activities that meet Guideline 2.

- Furthermore, the American Council for Physical Education for Children (COPEC) of the National Association for Sport and Physical Activity (NASPE) recently developed PA guidelines for children. These guidelines which are commonly referred to as the NASPE Physical Activity Guidelines for children (NASPE, 2004:1), are summarized as follows:

- Elementary school aged children should accumulate at least 30 to 60 minutes of activity per day and develop mentally appropriate PA from a variety of physical activities on all, or most days of the week.

- An accumulation of more than 60 minutes, and up to several hours per day, of age and mentally developed appropriate PA is encouraged for elementary school age children.

- Some of the children's activity each day should be in periods lasting 10 to 15 minutes or more, and include moderate to vigorous activity that is typically intermittent in nature, involving alternating moderate to vigorous activity with brief periods of rest and recovery.

2.4 Physical fitness testing

Physical fitness testing for field team sports players is a very important part of research and development within a particular sport. It allows investigators to establish norms and thus make objective comparisons between players in different ages, genders, and level of leagues from other countries. Such information about fitness demands can be obtained by using fitness tests that evaluate physical performance capacity. Performance is an assessment of how well a task is executed and the success of a training program is largely dependent upon satisfying the performance aims associated with it (Arce, 1994).

2.4.1 Definition of fitness testing

A physical fitness test is a test designed to measure physical speed, strength, agility and endurance. Reiman & Manske, (2009) have defined a testing as using a set of problems to assess abilities. Therefore, performance testing means using a set or tool of tests to determine performance abilities or functional limitations. A functional limitation is the inability to perform a particular activity at a normal level. In addition, Coulson & Archer, (2009) have defined testing as a statement about the quality or value of what has been measured and thus involves the tester making a decision, so interpreting a score for each player. This mean, it is first necessary to define the intent of baseline testing and then develop a practical model for application

2.4.2 Benefits of fitness testing

It is important to optimize and develop player performance and this process to assess a player performance requires a determination of requirements and the continuous determination of physical performance using appropriate methods and procedures. The aim is to assess the performance achieved as quickly as the players. Performance tests for sport players can be designed to cover the physical fitness components, technical and tactical of the game. Fitness testing is used throughout players to document, assess and predict sports performance Bangsbo, (2003). It is important that the players and coaches obtain objective information about the player's physical fitness characteristics to clarify the objectives of training. A successful training program for these players is one that will maximize all of the required skill and fitness components of the game. An essential part to any training program is fitness performance testing, which can help identify weaknesses, monitor progress, provide feedback, educate coaches and players, and predict performance potential Bangsbo, 2003; Carling et al., (2009).

Fitness tests are the only effective and objective way to evaluate a training program. The use of post testing data permits accurate evaluation of many qualities. A coach will be able to see progress since the player‟s previous tests or compare data with a previous group of players of the same age, position, or experience (Bisanz & Gerisch, 2008a; Schmid & Alejo, 2002). The particular test mode and outcome measures chosen must therefore be selected carefully in order to meet the objective of monitoring the effectiveness of player‟s physical preparation Cronin & Hansen, (2005).

Physical fitness characteristics of player in top sports depends on the players technical, tactical and physiological characteristics. These components are closely linked to each other. In sports such as soccer and rugby union, players perform different types of exercise ranging from standing still to maximal running with varying intensity. Therefore, Competitive naturally provides the best test for players, but it is difficult to isolate the various components within the sport and get objective measures of sport performance without performance testing for all players. Fitness testing can provide relevant information about specific parts of a sport Bangsbo, Mohr, Poulsen, et al., (2006). There are many reasons for performance testing and evaluating training processes. (Bangsbo, 2003; Carling, et al., 2009; Dick, 2007; Ebben, 1998; Gamble, 2010; Reiman & Manske, 2009; Reinhold, 2008; Sayers et al., 2008; Thiess & Schnabel, 1995) demonstrated the next reasons for performance tests, which all field team sports as soccer and rugby players and coaches need it to be successes in their sport: to assess the current physical state of the players, to study the effect of a training program, to motivate players to train harder, to give players objective feedback, to make players more aware of the objectives of the training, to evaluate whether a players are ready to play a competitive matches, to plan short and long term training programs, to determining players positions placement and ranking them, to establish homogeneous groupings for training and place players in small sides training, to establish the physical characteristics demanded of a given sport, to identify a relationship between individual performance capacities and demands of competition, to monitor progress during rehabilitation or determine whether an athlete is ready to compete and monitor his health status, to examine the development of performance from year to year, to enable future performance to be predicted, and to provide data for scientific research on the limitations of performance. Fitness tests results provide baseline scores on various measures of player’s ability, so that realistic goals can be set and degree of

improvement quantified. The following points should be considered when establishing aims for the player:

- The coach must be aware of the basic physical abilities required for performance at the competitive level of the team and how can make training for this
- the coach must have enough knowledge about exercise science to have a good idea of what a training program can achieve for each individual on the team and also designed for every time in season
- the coach should encourage players to internalize the goals to promote the physical, mental, and emotional commitment necessary to work toward the goals
- players should keep one or more copies of the goals in places where they will be seen daily and players should make their goals known to their training partners so they can work together and motivate each other to achieve their goals Baechle & Earle, (2008).

Physical fitness tests will be useful if it is repeated at regular intervals and same procedures. In this way can progress be monitored or issues affecting performance be identified. Therefore, the accurately physical fitness tests must be selected tests that are valid, reliable and objective. From this background, it is necessary to present and understand the scientific criteria of measurement methods.

2.4.3 Criteria of fitness testing

There is a need for a review of quality criteria and the feasibility of physical fitness characteristics tests in field team sports. (Baechle & Earle, 2008; Dick, 2007) demonstrated that the fitness testing procedure must be *objective* (consistency of result), *reliable* (consistency of reproduction) and *valid* (testing what it purports to test). These three characteristics are the key factors in evaluating test quality and must be present for the test to be beneficial.

2.5 Physical Education Programs

From an educational standpoint, it is imperative that standards be established that will guide the physical development of children and youth throughout their years of formal schooling. Effective physical education programs should set clear expectations of students, specifically designed as age appropriate. Expectations should not only cover the development of motor skills, they should include aspects of the cognitive and affective domains as well. Those in charge of setting standards, such as those implemented in South Carolina (South Carolina Department of Education, 2004), should be applauded for showing a commitment to the overall health of their children.

In South Carolina, seven different standards must be met if an individual is to be considered physically educated. All standards are addressed at each grade level, though each is modified so that it is age appropriate. In addition, all standards at each grade level are given an example of assessment that are used to monitor student learning and development. For example, physical education standard number one states that students should be able to demonstrate competency in many movement forms and proficiency in a few movement forms. The standard is then modified for age appropriateness so that, in preschool and kindergarten, the standard specifies that students should be able to display most fundamental movement patterns (e.g., throwing, receiving, jumping, and striking) in simple conditions and demonstrate control of the varied use of these patterns. Each standard includes several benchmarks so that student learning can be monitored. An example of a benchmark for preschool and kindergarten is: the student will travel with control forward, backward, and sideways using a variety of locomotors patterns and change directions quickly. In addition to the benchmarks, an example of assessment is given which includes teacher observation along with criteria for assessment of the movement patterns. If the task is to demonstrate a locomotors skill (e.g., slide, hop, skip, or gallop), the teacher assesses the task and three points are given if the student demonstrates each pattern at a level of mature form. If the student demonstrates the beginnings of each pattern but it is not fully developed, two points are given. Finally, one point is given if there is no evidence that the student can demonstrate the pattern at the time. This is just one example of the format used for students in the state at each grade level. The South Carolina Department of Education (2004) website provides further information regarding effective physical education programs and a complete list of state standards. It is of utmost importance that all educational systems adopt these kinds of standards and make a more concerted effort to hold educators accountable for teaching and measuring them.

2.5.1 Age-appropriate Activities

As educators and parents consider how to help children develop the five health-related fitness components it is important to consider the age-appropriateness of activities. Obviously, one would not expect a young child in the first or second grade to participate in the same type of muscular strength and endurance training as a senior in high school. It is necessary to develop exercise prescriptions for both the elementary, middle grades, and secondary levels. The goal of the prescriptions is to increase the activity level of all students to at least 60 minutes per day by suggesting activities which students can engage in outside of the classroom. Within this

prescription, detailed instructions must be given for activities that are age appropriate for the development of each health-related fitness component; students can chart the time spent engaged in the various activities for their math classes and write about their exercise in their language arts classes. It is important to consider that fitness activities need to be made fun for children or they will not want to participate. For most individuals, giving a direct command to go out and run two laps will not be an interesting activity in which to participate.

In the area of cardiovascular endurance some fun activities for elementary age and middle school students might include: flag tag, a 15-minute fun circuit, or a family fun walk. In a game of flag tag, each student puts a flag in their back pocket. On the signal the students begin chasing others around the designated area, attempting to grab as many flags as they can. At the end of 1 minute, stop the game; the person with the most scarves is declared the winner for that round. The 15-minute fun circuit includes stations for jump rope, jumping over a hoop, jumping jacks, and mountain climbers. Adding music to the fun circuit makes the activity even more appealing. The family fun walk is an activity that can take place at home. With the family, students are encouraged to take a brisk 20- minute walk throughout the neighborhood. A list of items to be found along the walk can be compiled to make the walk into a scavenger hunt type of activity. For middle grade or secondary age students, flag tag can be modified into rollerblade flag tag. The same directions would apply with the exception that the students are rollerblading instead of jogging. Jumping rope is another cardiovascular activity that older students can enjoy. Creating task cards and routines as well as setting the activity to music is an excellent way to engage students in a cardiovascular workout. It is also important to consider that basic activities such as jogging, walking, swimming, and aerobic dance are also considered excellent activities for people of all ages that promote cardiovascular endurance. When most people think of muscular strength and endurance training, they immediately think of weight training in the weight room. However, educators should be aware that weight training is not a feasible activity for younger children. There are many activities that students of all ages can engage in without ever entering a weight room facility. For elementary age children, activities like tug-of-war, push-up routines, and the use of a stability ball can all assist in the development of muscular strength and endurance. Middle school and secondary level students can also use the stability balls, yet they may also safely begin workouts within the weight room environment.

It is crucial for educators and parents to understand that teaching proper technique as well having

proper supervision are key elements in a successful weight lifting program. Body composition can be developed through a variety of activities. The stability ball can be used to perform sit-ups and crunches for students of all age levels. Each activity can be modified to fit the ability level of all students. For example, level one would consist of sitting on top of the ball, lying back and performing a certain number of sit-ups. In level two, there is a slight increase in the difficulty of the task. At this level, the student slides down the ball with their back at a slight angle. The student then attempts to perform the set number of sit-ups. Level three would be the most difficult. The student would lie down with their back on the ground, and their legs on top of the ball while performing the sit-ups. Older students can also use weight training as a method of developing body composition. Educators and parents need to also consider the importance of proper diet along with these methods of exercise when attempting to develop body composition. The development of flexibility is mainly acquired through stretching programs. Stretches can be categorized on a continuum from static (no motion) to ballistic (rapid motion) (Kurz, 1994). Static stretching involves stretching a muscle to the farthest point and holding the stretch. Isometric stretching is a type of static stretching which involves resistance of muscle groups through the tensing of the muscles. This type of stretching is considered one of the best ways to increase flexibility. Passive stretching is sometimes referred to as relaxed stretching.

During a passive stretch, an individual would assume a position and hold it using another part of the body, a partner, or an apparatus of some type. This type of stretching is good for cooling down after a workout because it helps to reduce muscle fatigue and soreness. Active stretching includes assuming a position and holding it there with no assistance other than using the strength of your agonist muscles. Active stretches are usually very difficult to hold for more than ten seconds and should not be held any more than fifteen seconds. One would find this type of stretching in an activity such as yoga. Dynamic stretching involves moving parts of one ‘s body and gradually increasing reach, speed of movement, or both. Dynamic stretching can be useful as part of a warm-up for an aerobic workout. Ballistic stretching uses the momentum of a moving body part or limb in an attempt to force it beyond its normal range of motion. This type of stretching is not considered useful and it has also been known to lead to injury. As mentioned earlier, any physical activity designed for young children needs to be made fun. Although stretching routines can be very monotonous, they can be made more exciting for young children by simply adding music and giving each stretch a unique name.

2.5.2 Classroom-based Activities

Although the physical education classroom is a critical area for the development of the physical domain, the push for more physically active students should not end there. Educators need to be aware that young children learn about the world through movement and physical activity. Classroom teachers should keep in mind that physical activity can be integrated within other subject areas to give children opportunities for more movement throughout the day. One way to incorporate this physical activity would be to use a thematic approach to teaching units within the curriculum. An example of a thematic approach would be an Olympic Games theme. In the area of Language Arts, students can read books, write reports, and perform skits that pertain to the games and athletes of the Olympics. Students can be shown maps in Social Studies, where they can compare the geographical locations of where they live and the place where the games are being held. A scale could be made up that shows the number of steps taken that are equal to a certain number of miles. Students could be given pedometers to calculate how many steps they have taken since the last class period. Each day when the students enter the classroom, they would go to the map and chart their ―distance traveled‖ toward the sight of the Olympic Games. In math class, students can be introduced to the use of stopwatches. Teachers can have the students 'time each other in a few physical skills and the data collected can be analyzed and graphs can be made using the results. Finally, in physical education classes, students could participate in activities similar to those of the Olympic Games. Through the use of this theme, each subject area teacher will have then done a small part in incorporating some type of physical activity into their classroom.

2.5.3 Parent Involvement

In addition to introducing children to physical activity through physical education programs and integrated curriculum parents can be encouraged to become involved in this aspect of their children 's development. Children today are leading a more sedentary lifestyle than ever before (U.S. Department of Health and Human Services, 2001). The days of coming home from school and playing outside until dark have been replaced with activities such as watching television, surfing the internet, and playing video games. However, there are many things that parents can do to get children out of the house and involved in some type of physical activity (New York Online Access to Health, 2004). Some of these activities may include taking family walks or bike rides, going to the park or other recreational facilities, encouraging participation in extracurricular activities, and encouraging playtime outdoors. Parents should also get involved in school activities.

They can ask their children what they are doing in physical education or better yet, visit them in class. Encouraging them to practice skills learned or practicing with them can be an effective way to keep them turned on to physical activity.

2.6 The Tran theoretical Model (TTM)

According to the TTM, recovering from problem behaviors or successful behavior change involves movement through a series of stages (Prochaska, DiClemente, & Norcross, 1992). The various stages of change include pre-contemplation (are not currently physically active and have no intention of doing so in the near future) and contemplation (not currently physically active but who have an intention to start in the near future). Individuals in the next stage, preparation, according to Marcus and Simkin(1994) are individuals who are currently exercising some, but not regularly_. The action stage represents people who are currently active, but have only recently started. The last stage is the stage of maintenance. It includes those who are currently physically active and have been for some time, usually at least six months (Biddle &Mutrie, 2008). A recent study located differences within a stage. Three subgroups of contemplators existed: early and middle contemplators, and those in pre-preparation. Early contemplators are viewed as individuals who have low self-efficacy, view few benefits and many disadvantages of exercise and are at risk of regression. Middle contemplators are individuals with low self-efficacy and approximately equal pros and cons towards exercise. Individuals in pre-preparation are those who are ready to move to the next stage (i.e., stage of preparation), elicit high self-efficacy and report low disadvantages of exercise. Thus with its various stages, the trans-theoretical model helps delineate change in adoption of health related behavior.

The TTM assists individuals in making transitions across the various stages of change in exercise related health behavior (Prochaska& Marcus, 1994). The trans-theoretical model states that stage transition results from stage-specific cognitive and behavioral process. According to Kim (2008), cognitive processes obtain information from an individual's own actions while information for behavioral processes is obtained from environment events. People at different stages of change are hypothesized to use distinct processes of change. In a study detailing the association of stage and processes of change with adoption and maintenance of muscular fitness-related behavior, Cardinal &Kosma (2004) observed cognitive processes to peak in the contemplation stage while behavioral processes steadily increased from the precontemplation to maintenance stage at which point the behavioral processes leveled off. Stage match intervention uses the main constructs of the TTM

and is matched to the in dividual‘s stage of readiness for exercise behavior (Kim, 2008). Hence, stage-matched interventions use different strategies and techniques based on the stage the individual is in to bring about effective changes in exercise behavior. A recent study on Type 2 diabetics inSouth Korea (Kim, Hwang, &Yoo, 2004) compared a stage-based intervention with regular physical activity education advice. The stage based intervention included stage matched counseling strategies based on the main constructs of the TTM such as processes of change (POC), self-efficacy (SE) and decisional balance (DB) along with individual exercise prescription and telephone counseling. Significant increases in overall stage of change (SOC) and physical activity levels were noted in the stage matched intervention group. A higher percentage (77.4 %) of the participants progressed from baseline in the intervention group as opposed to only 4.3% in the control group. Similar increases in SOC and physical activity have been observed in other studies comprising of urban older adults (King, Pruitt et al.,2000) and in younger adults in a worksite setting (Marcus &Simkin, 1994).

2.7 Social Cognitive Theory

The social cognitive theory (SCT) was developed in the 1980_s by Albert Bandura. According to Bandura (2004), the social cognitive theory specifies a core set of determinants, the mechanism through which they work and the optimum ways of translating this knowledge into effective health practices. The core determinants for effective health practices of individuals include knowledge of health risk and benefits of different health practices, perceived self-efficacy, outcome expectations, health goals people set for themselves and perceived social and structural facilitators. Bandura (2004) states that change in health behavior require motivation and self-regulation. People must learn to monitor their health behavior, motivate themselves, set goals and establish social support to sustain their effort. Strategies to increase social support and self-regulatory skills have been highlighted by Nahas, Goldfine, & Collins (2003) in their report on determinants of physical activity in adolescents and young adults. A recent intervention study by Ince (2008) using the social cognitive concepts as explained by Bandura (2004) and Nahas, et al. (2003) on 62undergraduate students resulted in significant improvements in exercise behavior and other benefits like health responsibility, nutrition, social support and stress management. Self-efficacy, a key construct of social cognitive theory, is defined as people ‘s judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with judgments of what one can do

with whatever skills one possesses (Bandura, 1997). Bandura (1986) listed four sources of efficacy information, namely prior success and performance attainment, imitation and modeling, verbal and social persuasion and judgments of physiological states.

Schwarzer (1992) stated self-efficacy to be a very powerful behavioral determinant and its inclusion in theories of health behavior therefore is warranted. Hofstetter, et al. (1991) found self-efficacy to predict walking in a large adult community. Similarly, Sallis, et al. (1992) have shown self-efficacy to predict exercise change over time. McAuley&Blissmer (2000) state that the relationship between self-efficacy and physical activity is complex. Self-efficacy beliefs are likely to be more influential in conditions that are challenging in comparison to situations that are more habitual and require less effort.

2.8 Self Determination Theory

Deci and Ryan (1985) proposed the self-determination theory. It is a macro-theory of human motivation concerned with the development and functioning of personality of social contexts. According to Deci and Ryan (1985), the theory focuses on the degree to which people endorse their action and engage in actions with a full sense of choice. The theory also suggests human beings are active organisms, with innate tendencies toward psychological growth and development, who strive to master ongoing challenges and to integrate their experiences into a coherent sense of self. In order to function effectively and overcome challenges, human beings must be able to satisfy the three basic psychological needs of individual competence, autonomy and relatedness.

According to Deci and Ryan (1985), to the extent to which the basic needs are satisfied, people will function effectively and develop in a healthy way, but to the extent that they are thwarted, people will show evidence of ill-being and non-optimal functioning. Motivation, though often recognized as a single construct, is governed by a myriad off-actors and personal experiences. Ryan and Deci (2000) stated that people can be motivated because they value an activity or because there is strong external coercion. They can be urged into action by an abiding interest or by a bribe. They can behave from a sense of personal commitment to excel or from fear of being observed. These situations contrast between cases of having internal motivation versus being externally pressured by an individual or situation. Extrinsically motivated behaviors are those that are performed to obtain rewards or outcomes that are separate from the behavior itself (Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997).

Self-determination theory suggested that people experience more self-determined (or internally controlled) types of motivation when the activities they participate in make them have competence (the ability to effectively perform the behavior), relatedness (authentic social connections with others) and autonomy (the power to make their own choices). More self-determined types of motivation are desirable because they are associated with positive experiences and continued motivations to participate (Deci& Ryan, 1985).

In a study comparing exercise adherence in 40 university students participating in either Tae Kwan Door aerobic exercise, Ryan, et al., (1997) observed better adherence in the Tae Kwan Do group. On further analysis, they attributed the better adherence to increased enjoyment and competence motives in the Tae Kwan Do participants. In the exercise domain, exercise is more extrinsically motivated as compared to sport. Most people maintain their exercise activities that are not inherently interesting or enjoyable to them but have something to gain from it (Ryan, Williams, Patrick, &Deci, 2009). A lack of intrinsic motivation to exercise activity leads to low adherence in a long term perspective. In a recent meta-analysis of the self –determination continuum, Chatzisarantis, Hagger, Biddle, Smith, & Wang (2003) found moderately strong correlations between more self-determined forms of motivation and measures of intention and competence.

2.9 Socio-Ecological Theory

Ecological models of health behavior are models proposing that behavior is influenced by interpersonal, socio-cultural, policy, and physical-environmental factors (Sallis& Owen, 2002) The purpose of the ecological model is to primarily focus on the environmental causes of behavior and to identify environmental interventions to promote health (McLeroy, Bibeau, Steckler, & Glanz, 1988). Ecological theory has been extensively used to determine correlates of physical activity. Seasons are often associated with physical activity and time spent outside is the best correlate of physical activity in young children (Sallis& Owen, 2002). Irrespective of socioeconomic status of people, those residing nearthe coast reported higher levels of physical activity (Bauman, Smith, Stoker, Bellew, &Booth, 1999). Proximity to physical activity programs is an important factor for both young individuals (Sallis, Prochaska, & Taylor, 2000) as well as older adults (Booth, Owen Bauman, Clavisi, & Leslie, 2000). Convenient exercise facilities not only were strongly associated with physical activity but also strongly predicted vigorous physical

activity in men although these findings were not true in for case of women (Sallis, Bauman, & Pratt, 1998).

However, no direct association was present between the presence of recreational facilities and meeting recommendations. These findings suggest that individual-level factors and other environmental supports must be present before an individual engages in the recommended level of recreational activity. Increasing participation in regular physical activity has now become a national priority for many industrialized nations. Interventions have the best effect when they alter and modify the underlying correlates that influence physical activity. Exercise, like any other component of health care, is bounded by physical, personal and environmental factors (Arcury et al. 2006).

The failure to meet the Healthy People 2000 recommendation are result of the lack of understanding the underlying determinants that govern an individual or society ‘s participation in leisure time physical activity. In a recent review of the correlates of adults_ participation in physical activity, Trost, Owen, Bauman, Sallis (2002) have concluded that participation is influenced by a diverse range of personal, social and environmental factors. These factors are referred to as determinants. Determinants denote a reproducible association or predictive relationship other than cause and effect. Determinants that reside or originate within the individual are included under personal factors. These include demographic correlates, biomedical status, past and present physical activity performance, and psychological states and traits associated with physical activity (Dishman 1988).

In studies comparing men and women, physical activity patterns were higher among males when compared to females and were also inversely associated with age (Trost, Owen, Bauman, Sallis 2002). Overweight and obesity also has a strong negative influence on physical activity. Martinez-Gonzalez, Martinez, Hu, Gibney,and Kearney (1999) found that after controlling for age, time spent sitting, sex, education, social class, marital status, smoking, country of origin, individuals in the upper quintile for leisure time physical activity were approximately 50% less likely than those in the lowest quintile to be classified as obese. Psychological determinants of physical activity include enjoyment of physical activity, expected benefits, value of physical activity outcomes, intentions, perceived behavioral control, normative beliefs, knowledge of health and exercise, self-efficacy, self-motivation and stage of change.

In a study examining the influence of self-efficacy perceptions in a cohort of healthy adults between the ages of 50 and 64, baseline self-efficacy perceptions significantly predicted exercise adherence after 2 yrs. of follow up (Oman and King 1998). In a population of elderly men and women, barriers to physical activity such as lack of time, too weak, too tiring, fear of falling, bad weather and no exercise partners, emerged as the greatest influence on leisure time activity (Lian, Gan, Pin, Wee, Ye 1999). The physical environment acts as a determinant of physical activity. Accessibility to a facility, the appeal of the surrounding environment, perceived threats and climatic conditions are the strongest predictors of physical activity among environmental factors (Dishman 1988; Trost, Owen, Bauman, Sallis, Brown 2002). Access to a facility is a necessary but not a sufficient facilitator of community sport and exercise participation. Perceived convenience of the exercise setting and actual proximity to home or place of employment are consistent discriminators between those who choose to enter or forgo involvement and between those who adhere or dropout in supervised exercise programs (Dishman 1988). In one supervised exercise program, those most likely to drop out actually lived closer to the chosen activity setting, although they perceived inconvenience as a factor leading to their return to inactivity (Gettman, Pollock, Ward 1983). A study involving Australians aged 60 yr and over, found that having friends who participated regularly in physical activity, safe footpaths for walking, and having access to a park were significantly associated with regular physical activity (Booth, Owen, Bauman, Clavish and Leslie 2000).

2.10 Urban areas

Is an area with an increased density of human created structures in comparison to the areas surrounding it, Urban areas may be cities, towns or conurbations? In fact, urbanized areas agglomerate and grow as the core population/economic activity center within a larger metropolitan area or envelope. People living there are open, they choose their cultures and their beliefs and share them and that's what makes them a very modern society. They care most about technology, communication, economy, etc. and always look forward to develop and extend markets, diversification products (answers.yahoo.com august 20019).

2.11 Rural areas

Are most recognized as farms, and less density areas, and also mostly a tight community that can affect one another easily. In summary, rural is any territory that is not urban or in other words the word rural is what is left over after urban has been defined (cber.cba.ua.edu august 20019)

CHAPTER THREE

3. RESEARCH METHODOLOGY AND MATERIAL

3.1 Research Design

The research designed in this study was attempt to compare selected health related physical fitness of urban and rural high school students of south wollo zone, cross-section method was employed in the study. since it helps to measure, assess, and evaluate the current status of an area of the study.

3.2 Description of the study area

This study was conducted in south wollo zone at Dessie, Dessie located in northern Ethiopia. It is 400 k/m far from Addis Abeba which is the capital city of Ethiopia. South wollo zone is border on the south by north sewa and the oromo region, on the west by East Gojjam, on the northwest by South Gondar, on the north by North Wollo, on the northeast by Afar Region, and on the east by the Oromia Zone and the Argobba special woreda. Its highest point is Mount Amba Ferit. Towns and cities in South Wollo include Kombolcha, Hayq, Dessie, Wuchale, and Mekaneselam.

- Rural high school indicate in
- Urban high schools indicate in

3.2 Population of the study

The researcher was purposely select accessible population from south wollo zone and target population were selected based on the rurality and urbanity of the school from accessible population which are legahid, albuko, kalu and desssie town, this area where indicated in arrow in the above map of south wollo zone.

3.4 Sample and sampling techniques

The samples were selected randomly from selected high school of urban and rural school of south wollo zone for urban high school dessie town kidame gebeya and hote high schools was selected purposely from this high school 40 students were randomly selected from 3914 accessible populations. And in the other side for rural high school's students, from kalu worda 14 students albuko woreda 12students, and legehida woreda 14 students was selected from this selected woredas totally 40 high school students were randomly selected from 526 accessible populations.

Table 3.4 Sampling

Urban area						Rural area					
No	Dessie town	Grade 9		Grade 10		No	woredas	Grade 9		Grade 10	
		Popu	Samp	Popu	Samp			Popu	Samp	Popu	Samp
1	Kidame gebeya	940	10	812	10	1	Legehida	103	7	63	7
						2	Albuko	92	6	56	6
2	Hote	1250	10	912	10						
						3	Kalu	124	7	88	7
Total	2	2190	20	1724	20	total	3	319	20	207	20

3.5 Instrument of data collection

type of data collection in this study was used, by testing health related physical fitness of students. The field tests were muscular strength (lower body muscular strength) test (standing log jump), muscular endurance (90^0 push up), flexibility test (sit and reach test) and body composition or (BMI) thought measuring weight and height, Detailed procedures of each measurement are presented in the appendices.

3.5.1 Materials

For the success of this study facilities and materials were required such as cone, stop watch, whistles, recording sheets, measuring tape (meter), weight scale and sport field where tests held.

3.5.2 Test procedure

In order to evaluate the selected health related physical fitness of high school students. The following tests procedures were applied

- ✓ **Test Sequence**
  - **Flexibility (sit and reach test):** the flexibility tests were scheduled early in the session prior to any activity, or after a thorough warm up or after the speed tests.
  - **Muscle Strength (standing broad jump):** it was the second test, after flexibility test there will be five minutes' interval before it conducts.
  - **Muscular Endurance (90-degree pushup):** it was the last test and a minimum break of five minutes will have recommended between muscle strength and muscle endurance tests.
  - **BMI:** measuring weight and height
- ✓ **Safety**

Safety checks was done prior to any testing session, such as checking for the proper working of equipment, and adequate supply of safety equipment such as mats, water bottles and first aid kits. During the sessions, give adequate warm-up when necessary.

- ✓ **Recording Sheets**

Well-designed scoring sheets make recording scores more efficient and avoids errors.

- ✓ **Time of testing**

environmental and air conditions were considered before tasting, time of test will be 3:30 o'clock in the.

- ✓ **Test Assistants**

All test assistants were adequately trained prior to testing, to ensure correct administration of the tests, and reduce error between testers.

3.6 Procedure of data collection

The researcher was applying three steps for collecting the data form participants ***First steep***: relevant literature was review to get adequate information for the topic.

Second steep: objectives and research question were formulating to show the direction of the study.

Third steep: data gathering tools were developed and Testing health related physical fitness were administrating, first flexibility test was administrated first, muscular strength was have followed then muscular endurance and BMI were administrated.

3.7 Data analysis

The data collected through fitness test, analysis by descriptive statistics means and standard deviations and t-tests were used to compare differences for selected health related physical fitness components (endurance, strength, flexibility and body composition),

3.8 Ethical consideration

This study was deal with the ethical issues related to the investigation. Making guarantees and confidentiality on the information that were being given to the study, and risk of harm due to participation. All actions based on the school rules, code of conduct and policies concerning to research ethics. The protocol was approving by the school guide lines, and written consent were given and informs the concerned bodies and participants.

CHAPTER FOUR

4. Result and Discussion

4.1 Introduction

This chapter presents the findings of the study. The analyzed data are presented in tables and figures and statistical significance was identified where appropriate. This section shows the results obtained from sit and reach test, 90-degree pushup test, standing broad jump test, BMI test. t-tests were used to compare differences in the means of variables. The study set out to compare selected health related physical fitness levels of Rural and Urban high school Students of south wollo zone.

4.2 Demographic Characteristics of the Study Participants

A total of 80 students of urban and rural high school students were selected for the study. From a total of 80 students 40 of them were selected from urban and 40 of them were from rural areas.

4. 1 Table of student's profile

		Urban female student		Rural female student	
	Item	No	%	No	%
Age	15 years	3	7.5	1	2.5
	16-17 years	33	82.5	29	72.5
	18years and above	4	10	10	25
Sex	Male	20	50	20	50
	Female	20	50	20	50
Weight	44-55kg	30	75	33	82.5
	56-65kg	10	25	7	17.5
	66 and above	-	-	-	-
Height	1.40-1.50	13	32.5	8	20
	1.51-1.60	17	42.5	12	30
	1.61-1.70	7	17.5	13	32.5
	1.70 and above	3	7.5	7	17.5

According table 4.1 student profile 40(100%) of the respondents are urban student, from this 15 years old student are 3(7.5%), 16-17 Years old students are 33(82.5%), and the remaining 4(10%) are above 18 Years old students and 40(100%) of the student's samples are rural students from

this 15 years old student are 1(2.5%), 16-17 Years old students are 29(72.5%), and the remaining 10(25%) are above 18 Years old students.

4.2.1 Selected variables and their criterion measures

4.2 Selected variables and their criterion measures

No	Variable	Criterion measures
1	Strength	Standing broad jump test
2	Endurance	90 degree modified pushup test
3	flexibility	Sit and rich test
4	Body composition	Height and weight

4.3 Hypotheses testing

The 80 subjects of high school student were separate into 2 groups of urban and rural when doing the test. 40 students from each area of urban and rural were represent by male and female and do the test. From the result showed, t-test was conducted to get all the result from the data collection. The following hypotheses were tested to find out whether there is a significant or not significant effect on this study.

Hypothesis 1

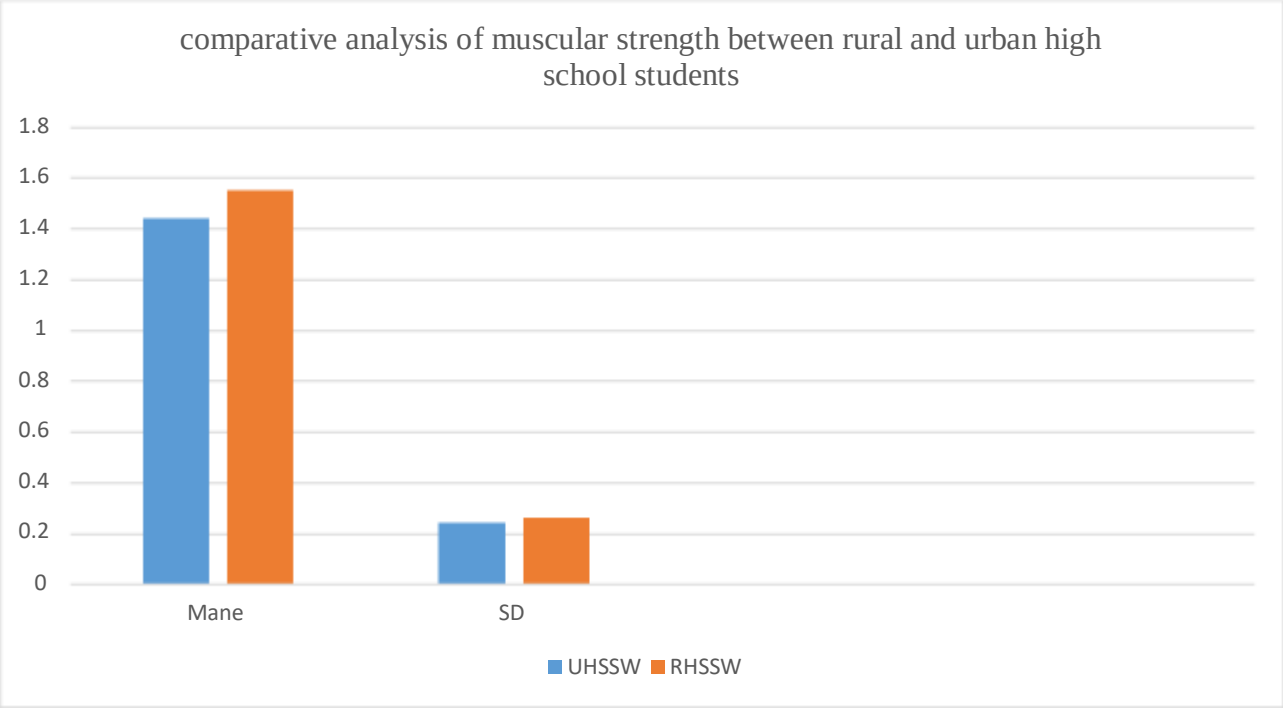
There is significant different in muscular strength between rural and urban high school students of south wollo zone? The data collected for muscular strength test were analyzed using t-test for differences between female defensive and offensive soccer players in the variables, the results of which are shown in the table.

Table 4.3 comparative analysis of muscular strength between rural and urban high school students

No	Group	Number	Mean	S.D	SEM	t	p
1	Urban high school students	40	1.44	0.24	0.038	-7.18	0.0001
2	Rural high school students	40	1.55	0.26	0.041		

$P<0.05$

The health related physical fitness test result presented by above table indicated that Urban high school students were recorded as 1.44, 0.24 and Rural high school students were recorded as 1.55, 0.26. The observed t-values (-7.18) in the table is lower than the critical value of 2.02 at the same degree of freedom. Therefore, the Ho rejected and the H1 accept in the Hypothesis 1. It can conclude that there is significant different in muscular strength between rural and urban high school students of south wollo zone.



Cart 4.1 Comparative analysis of muscular strength between rural and urban high school students

Hypothesis 2

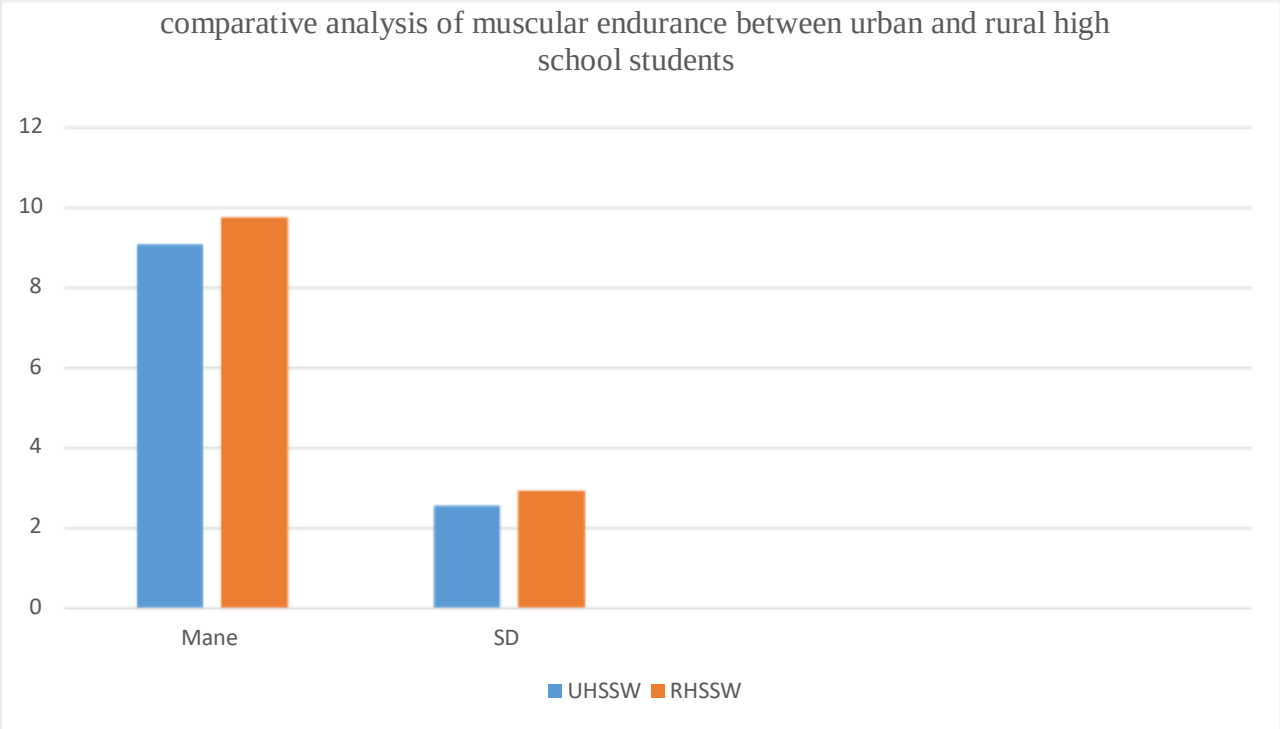
There is significant different in muscular endurance between rural and urban high school students of south wollo zone? The data collected for muscular strength test were analyzed using t-test for differences between female defensive and offensive soccer players in the variables, the results of which are shown in the table:

Table 4.4 Comparative analysis of muscular endurance (modified 90-degree push-up) between rural and urban high school students

No	Group	Number	Mean	S.D	SEM	t	p
1	Urban high school students	40	9.08	2.56	0.40	-2.06	0.0457
2	Rural high school students	40	9.75	2.92	0.46		

P<0.05

The health related physical fitness test result presented by above table indicated that Urban high school students were recorded as 9.08, 2.56 and Rural high school students were recorded as 9.75, 2.92. The observed t-values (-2.06) in the table is lower than the critical value of 2.02 at the same degree of freedom. Therefore, the H0 is rejected and H1 accept in Hypothesis 2. It can conclude that there is significant different in muscular endurance between rural and urban high school students of south wollo zone?



Cart 4.2 Comparative analysis of muscular endurance between rural and urban high school students

Hypothesis 3

There is significant different in flexibility between rural and urban high school students of south wollo zone? The data collected for muscular strength test were analyzed using t-test for differences between female defensive and offensive soccer players in the variables, the results of which are shown in the table.

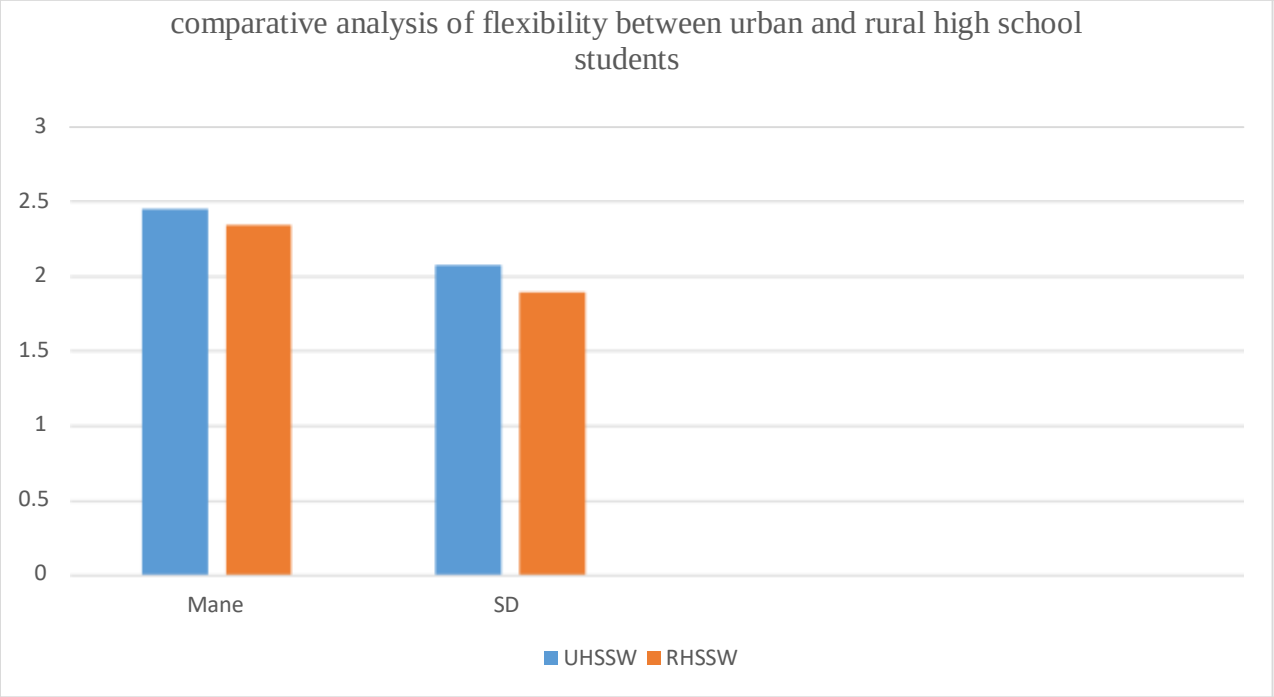
Table 4.5 Comparative analysis of Flexibility (sit and rich) between rural and urban high school students.

No	Group	Number	Mean	S.D	SEM	*t*	p
1	Urban high school students	40	2.45	2.07	0.33	0.26	0.7988
2	Rural high school students	40	2.34	1.89	0.3		

P<0.05

The health related physical fitness test result presented by above table indicated that Urban high school students were recorded as 2.45, 2.07 and Rural high school students were recorded as 2.34, 1.89. The observed t-values (0.26) in the table is lower than the critical value of 2.02 at the same degree of freedom. Therefore, the H0 is rejected and H1 accept in the Hypothesis 3. It can conclude that there is significant different in flexibility between rural and urban high school

students of south wollo zone?



Cart 4.3 Comparative analysis of flexibility between rural and urban high school students

Hypothesis 4

There is significant different in BMI between rural and urban high school students of south wollo zone? The data collected for muscular strength test were analyzed using t-test for differences between female defensive and offensive soccer players in the variables, the results of which are shown in the table.

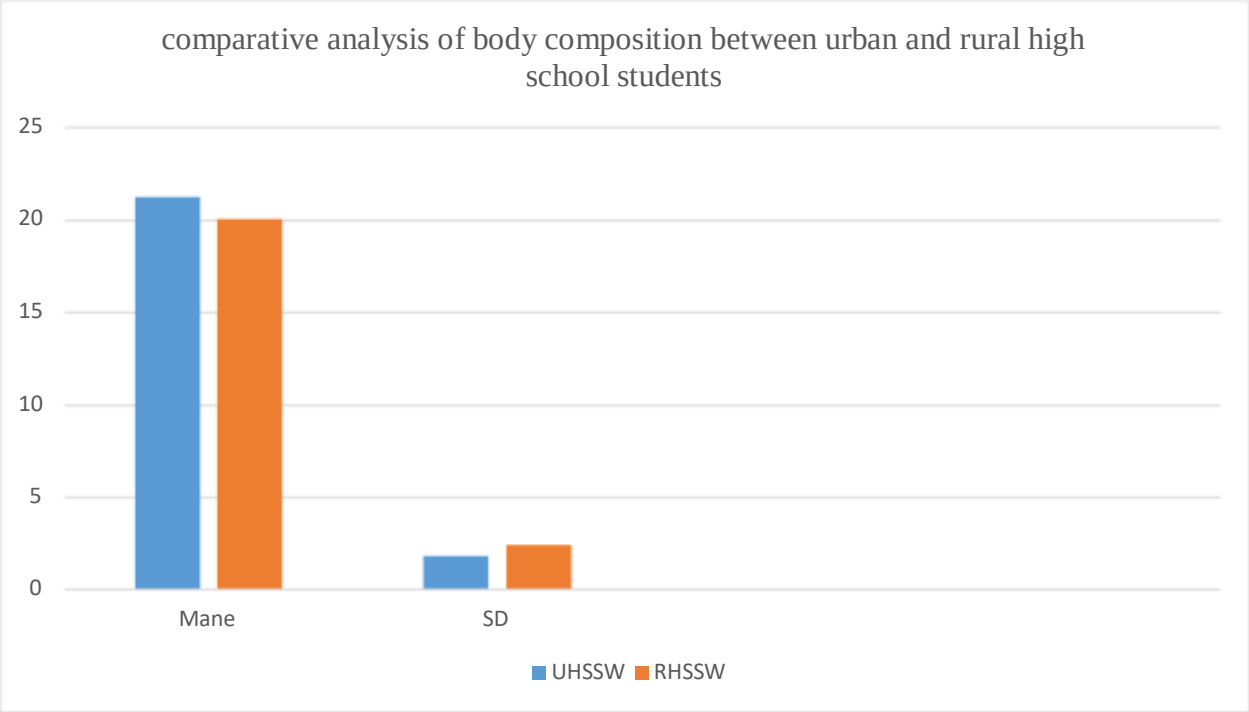
Table 4.6 Comparative analysis of body composition (BMI) between rural and urban high school students.

No	Group	Number	Mean	S.D	SEM	*t*	p
1	Urban high school students	40	21.22	1.83	0.29	-3.44	0.0014
2	Rural high school students	40	20.03	2.37	0.38		

P<0.05

The BMI test result presented by above table indicated that Urban high school students were recorded as 21.22, 1.83. The observed t-values (-3.44) in the table is lower than the critical value of 2.02 at the same degree of freedom. Therefore, the H0 is rejected and H1 accept in the Hypothesis 4. It can conclude that there is significant different in BMI between rural and urban

high school students of south wollo zone?



Cart 4.4 Comparative analysis of body composition between rural and urban high school students.

4.4 Mean and standard deviation of all variables of urban and rural high school students

Table 4.7 Mean and standard deviation of rural high school students

No	Variable	Units	Mean	S.D
	Strength	Meter	1.55	0.26
	Endurance	Second	9.75	2.92
	flexibility	Centimeter	2.34	1.89
	BMI	Kg and meter	20.02	2.37

Table 4.7 shows that the mean and standard deviation values of physical fitness of rural students. These values were recorded as variable wise, Strength 1.55 and 0.26, Endurance 9.75 and 2.92 respectively, Flexibility 2.34 and 1.89, respectively and BMI 20.02 and 2.37 respectively.

Table 4.8 Mean and standard deviation of urban high school students.

No	Variable	Units	Mean	S.D
	Strength	Meter	1.44	0.24
	Endurance	Second	9.08	2.56
	flexibility	Centimeter	2.45	2.07
	BMI	Kg and meter	21.22	1.83

Table 4.8 shows that the mean and standard deviation values of health related physical fitness of urban high school students. These values were recorded as variable wise, Strength 1.44 and 0.24 Endurance 9.01 and 2.56 respectively, Flexibility 2.45and 2.07, respectively, BMI 21.21 and 1.83 respectively.

4.5 Discussion

The purpose of the study was study to compare selected health related physical fitness levels of Rural and Urban high school Students of south wollo zone**.** The finding of the study reported

4.5.1 Physical Fitness

Differences between selected health related physical fitness levels of Rural and Urban high school Students of south wollo zone**.** are looked into in this study. Physical fitness characteristic investigated in the study were muscular strength, muscular endurance, flexibility and body composition.

4.5.1.1 Muscular strength test

The finding of the present study indicates that the mean and standard deviation values on strength (standing broad jump) between Urban and Rural high school students, Urban high school students were recorded as 1.44, 0.24 and Rural high school students were recorded as 1.55, 0.26 and t-values (-7.18. It shows that strength of Rural high school students is significantly better than Urban high school students. This finding is in agreement with those of rasht branch (2015), Tham Yin Choong (2015). Cevdet, T. (2007), Gill, Deol, Haochang (2013), Singh kumar (2011), Fizi (2011), Kaur (2010) rural and urban female students of Punjab University, Ghosh and Goon (2015) examined the comparison of physical fitness components of rural and the urban area school going female students and reached the conclusion that the rural area school students were better than the urban area female students. According to which there are significant differences between Rural and Urban high school Students muscular strength. This was attributed mainly because of the fact that rural students were related to perform physical activity in their daily activity Therefore, significant differences in these two physical fitness characteristics are justified.

4.5.1.2 Muscular endurance test

The result of the study indicates that the mean and standard deviation values on Endurance (modified 90-degree push-up) between Urban and Rural high school students, Urban high school students were recorded as 9.08, 2.56 and Rural high school students were recorded as 9.75, 2.92 and t-values (-2.06). It shows that Rural high school students are better than Urban high school students, result were agreeing with findings of ZainalFekri (2012), Singh kumar (2011), Vishal (2013), Haldar (2012). According to which there are significant differences between Rural and Urban high school Students muscular endurance. This was attributed mainly because of the fact

that rural students were related to perform physical activity in their daily activity Therefore, significant differences in these two physical fitness characteristics are justified.

4.5.1.3 Flexibility test

Flexibility (sit and rich) between rural and urban high school students, that Urban high school students were recorded as 2.45, 2.07 and Rural high school students were recorded as 2.34, 1.89 and t-values (0.26). It shows that no significant different between Urban high school students and Rural high school students in flexibility. the result of this study was agree with Bebcakova *et al*. [11], Petroski *et al*, Chillón *et*, Loucaides,C.A., Sue M. Chedzoy,S.M.,& Bennett, N. (2004), O.G Eiben, A. Barabas and A.Nemeth. (2005) abate tesfaye (2013). It shows that this may occur type of activity they perform and environmental condition.

4.5.1.4 Body composition test

The study clearly shows that the mean and standard deviation value on the body composition (BMI) between rural and urban high school students, Urban high school students were recorded as 21.22, 1.83 and Rural high school students were recorded as 20.03, 2.37 and t-values (-3.44). It shows that Urban high school students have higher BMI than Rural high school students. Body mass index (BMI) was determined from measures of height and body mass using the accepted method (BMI = body mass divided by the square of body height expressed in unit's kg/M), and participants were classified as thin, normal weight, overweight and obese using age- and gender-specific cut-off points presented by Cole et al. [34, 35]. The results of this study indicated that Urban high school students have higher BMI than Rural high school students. and BMI. This finding is in agreement with those of Bharati et al, 2005; Kolekar and Sawant, 2013; Khan et al, 1990; Adak et al, 2002).

CHAPTER FIVE

5. Summary, Conclusions, and Recommendations

This chapter is devoted to the presentation of summary, conclusions and recommendations forwarded on the basis of the finding presented in the previous chapter.

5.1 Summary

The purpose of the study was study to compare selected health related physical fitness levels of Rural and Urban high school Students of south wollo zone. To achieve the purpose of the study, 40 Rural and 40 Urban high school Students of south wollo zone were selected by using random sampling technique from purposely selected woredas of south wollo zone. The data collected were statistically analyzed using descriptive statistics of mean and standard deviation and inferential statistics of t-test for differences between in health related physical fitness of Rural and Urban high school Students. The results indicated the following:

- The finding of the present study indicates that the mean and standard deviation values on strength (standing broad jump) between Urban and Rural high school students, Urban high school students were recorded as 1.44, 0.24 and Rural high school students were recorded as 1.55, 0.26. It shows that strength of Rural high school students is significantly better than Urban high school students

- The result of the study indicates that the mean and standard deviation values on Endurance (modified 90-degree push-up) between Urban and Rural high school students, Urban high school students were recorded as 9.08, 2.56 and Rural high school students were recorded as 9.75, 2.92. It shows that Rural high school students are better than Urban high school students

- Flexibility (sit and rich) between rural and urban high school students, that Urban high school students were recorded as 2.45, 2.07 and Rural high school students were recorded as 2.34, 1.89. It shows that no significant different between Urban high school students and Rural high school students in flexibility.

- The study clearly shows that the mean and standard deviation value on the body composition (BMI) between rural and urban high school students, Urban high school students were recorded as 21.22, 1.83 and Rural high school students were recorded as 20.03, 2.37. It shows that Urban high school students have higher BMI than Rural high school students.

5.2 Conclusion

Based on the major summary of the study, to minimize the difference between health related physical fitness levels of Rural and Urban high school Students of south wollo zone the following points are stated as conclusion

- The finding of this study indicate Rural high school student's strength endurance and are better than Urban high school students because Urban life style make passive in physical activity for example using transportation and doing things by the help of technology and rural life style make active in physical activity for example doing labor work and students force to travel in every day activity and regular energetic activity produces better health related physical fitness status whereas Urban high school students demonstrate greater flexibility that of Rural high school students. It shows that this may occur type of activity they perform and environmental condition.

- Urban high school students have grater BMI than Rural high school students, this indicate that engaging physical activity passively results in higher BMI and lower in health related physical fitness.

5.3 Recommendations

The following suggestions and recommendations are made on the basis of the research finding and conclusions.

- The finding of this study revealed the previous findings of physical fitness components in rural and urban high school students. Urban life style make passive in physical activity for example using transportation and doing things by the help of technology and rural life style make active in physical activity for example doing labor work and students force to travel in every day activity. So urban students have to improve their fitness by doing PA
- In order to improve levels of physical fitness students should try to do at least an hour of PA every day. students should engage aerobic activity each day. This can include either moderate-intensity aerobic activity, such as brisk walking, or vigorous-intensity activity, such as running. Also being sure to include vigorous-intensity aerobic activity on at least three days per week. Muscle-strengthening activities (such as gymnastics) and bone-strengthening activities (such as swimming, running or rope skipping) are also recommended on at least three days each week (CDC, 2009).
- It is helpful for studies on comparison of health related physical fitness levels of Rural and Urban high school Students may be conducted in Ethiopia.
- It is also important to raise awareness of the importance of health related physical fitness among high school Students.
- Findings for this study will add to the existing data in the area of exercise and sports science.

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APPENDIX A

JIMM UNIVERSITY COLLEGE OF NATURAL SCIENCE AND DEPARTMENT OF SPORT SCINCE OF JIMMA UNIVERSITY FOR FULFILMENT OF MASTER OF SCINCE IN SPORT SCINCE (MED).

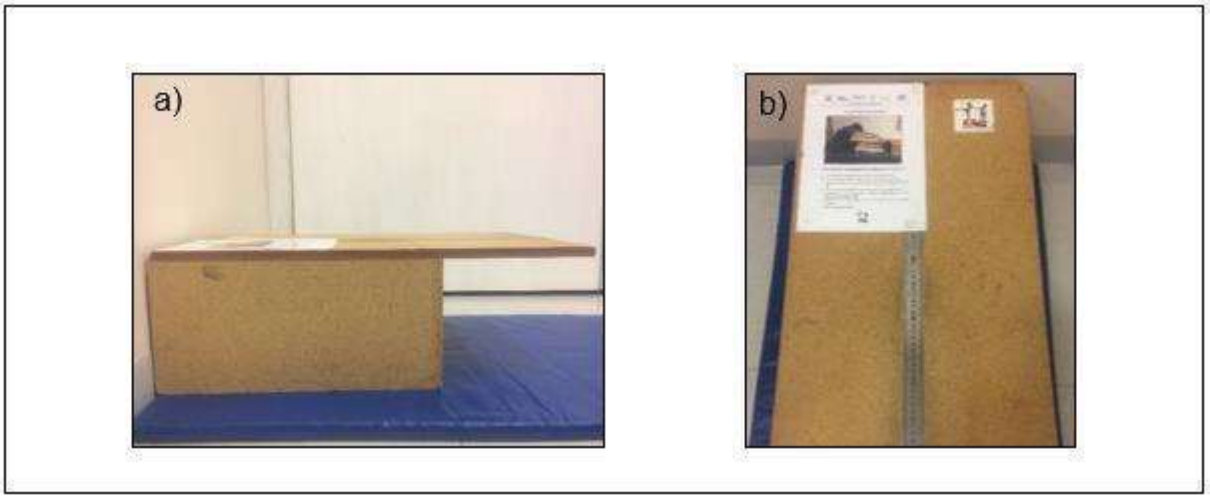
Flexibility test

Purpose of the measurement/test: To measure flexibility of the hip joint.

Equipment used:

- ✓ Box with measuring ruler; and
- ✓ 2 mats

Box construction (see Figure): A box will construct with a length and width of 40 cm and height of 24 cm (see Figure a). A long ruler of 75 cm with an overhang of 26 cm (0 cm in front of the learner, 75 cm at the end of the box) will secured on top of the box from which measurements will made (see Figure 3.6 b).



Method: Seated on a mat (shoes removed), the students will ask to stretch out their legs straight ahead of them with the soles of their feet placed flat against the box. Both knees will lock and pressed flat on the floor the test administrator assisted by placing her hand on the learner's knees. The learner will ask to reach as far forward as possible along the ruler, with hands on top of each other and palms facing downward. The learner will instruct to place his/her head between his/her arms when reaching forward, then to take a deep breath in and exhale when reaching forward. The test administrator ensured that no jerky movements occurred while reaching forward. The recorded value will at the farthest point, where the fingertips touch the ruler. The students will hold the position for two seconds before the distance will recorded.

Trials: Two trials

Scoring:

- ✓ The distance from 0 cm on the ruler to the edge of the fingertip will measured;
- ✓ Once the participant reached as far forward as possible, the position will hold for two seconds after which the value will recorded.
- ✓ Scores will record to the nearest 0.1 cm; and
- ✓ The best score of the two trials will used.

Test Date: _____

Test Location: _____

Name	Trial#1	Trial#2	Max score
1			
2			
3			

APPENDIX B

JIMM UNIVERSITY COLLEGE OF NATURAL SCIENCE AND DEPARTMENT OF SPORT SCINCE OF JIMMA UNIVERSITY FOR FULFILMENT OF MASTER OF SCINCE IN SPORT SCINCE (MED).

Standing broad jump

Purpose of the measurement/test: To measure lower body dynamic strength.

Equipment used:

- ✓ A starting line marked with black spray paint;
- ✓ Black spray paint;
- ✓ 1 tent peg;
- ✓ 1 tape measure;
- ✓ 1 t-stick; and
- ✓ 1 90° triangle.

Site construction: (see Figure): A take-off line will marke using black spray paint which will used to indicate the start line. The zero of the tape measure will secured behind the start line using a tent peg while the 90º triangle was used to ensure that a 90º angle will formed between the start line and the tape measure. A T-stick will use to read values accurately from the tape measure.

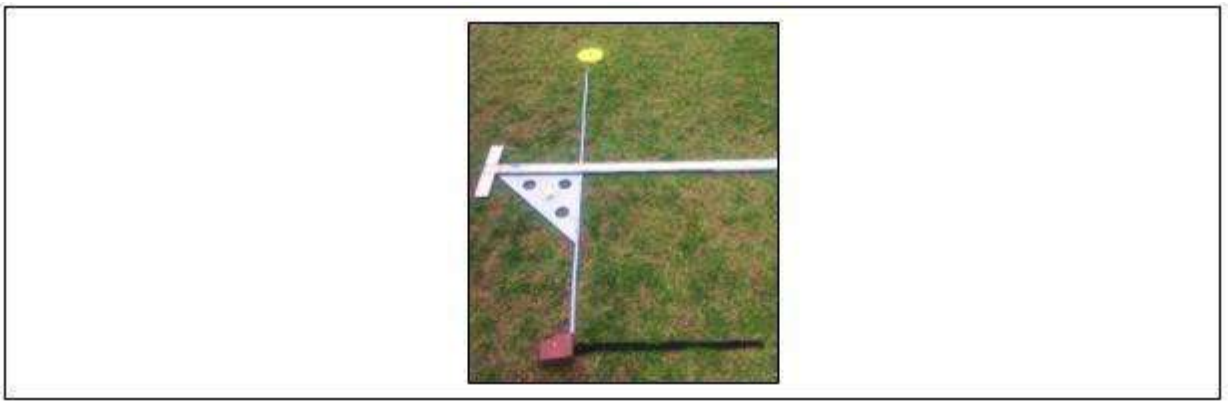


Figure: Standing broad jump site construction

Method: Learners will ask to jump from the start line as far forward as possible. The learners stood exactly behind the starting line with feet placed parallel to each other before the jump. The jump

will perform using counter-movement jump techniques. Participants started in an upright standing position, instructions will to simultaneously swing arms back, assume a squat position then immediately jump there will be no pause in the squat position (see Figure 3.12 a for visual). Upon landing, feet will require to land together - the learner needed to maintain equilibrium without hands touching the floor (see Figure 3.12 b for visual). One practice trial will allow, after which two trials will recorded. In the case of two invalid attempts, another attempt will allow.

Trials: Two trials

Scoring:

- ✓ The T-stick was used to accurately record the distance jumped to avoid error of parallax;
- ✓ The jumped distance will measure from behind the inside border of the take-off line to the nearest planted heel;
- ✓ Values will measure in centimeters (cm) and recorded to the nearest 1 cm;
- ✓ The furthest of the two jumps will recorded; and
- ✓ The following attempts will consider invalid and another trial was given:
    - Take-off with one foot
    - Falling backward or touching the ground behind the feet when landing.

Standing broad jump score sheet

Test Date: _____

Test Location: _____

Name	Trial#1	Trial#2	Max score
1			
2			
3			

APPENDIX C

JIMM UNIVERSITY COLLEGE OF NATURAL SCIENCE AND DEPARTMENT OF SPORT SCINCE OF JIMMA UNIVERSITY FOR FULFILMENT OF MASTER OF SCINCE IN SPORT SCINCE (MED).

90 degree Push-Ups

Test Objective and Rationale

The purpose of this test is to measure upper-body strength and endurance. The right-angle, or 90, push-up is recommended as a test of upper-body strength and endurance. Muscle fitness is required for people of all ages in order to perform daily living and recreational activities with vigor and undue fatigue. The objective of the test is to complete as many 90-degree push-ups as possible at a specified pace.

- Equipment

- It is necessary to acquire or prepare an audiotape or use a consistent cadence of one pushup every three seconds (1.5 seconds up and 1.5 seconds down). A cadence recording of
- two minutes will allow the completion of 40 push-ups (See Appendix G for cadence recording instructions).
- A right-angle marker (See Appendix E for instructions)
- Push-ups may be performed on a mat.

Test Description

Measuring upper body strength and endurance, students lower the body to a 90-degree elbow angle and push up. Set to a specified pace, students complete as many repetitions as possible.

Starting Position

The student assumes the prone position (face down).

Hands are placed slightly wider than shoulder width with fingers stretched out.

Legs are straight and parallel.

Feet cannot be resting against an object.

The back is straight.

The head is positioned so the student is looking slightly in front of his or her hands.

Pre-Test Observation/Marking

Have students lower themselves to the appropriate right-angle position. This allows the student to feel and the teacher to sight the correct position. The use of a right-angle marker, set in front of the student's elbow as a guide, allows for a more accurate sighting (position will vary for each student).

90 degree pushup test score sheet

Test Date: _____

Test Location: _____

Name	score
1	
2	
3	

APPENDIX D

JIMM UNIVERSITY COLLEGE OF NATURAL SCIENCE AND DEPARTMENT OF SPORT SCINCE OF JIMMA UNIVERSITY FOR FULFILMENT OF MASTER OF SCINCE IN SPORT SCINCE (MED)

90 degree modified push up score

student	RHSSW	UHSSW
Stu1	9	10
Stu2	11	8
Stu3	8	9
Stu4	10	11
Stu5	11	9
Stu6	11	10
Stu7	13	9
Stu8	12	13
Stu9	12	10
Stu10	13	8
Stu11	14	10
Stu12	14	12
Stu13	12	10
Stu14	11	12
Stu15	12	10
Stu16	13	14
Stu17	13	12
Stu18	14	13
Stu19	16	16
Stu20	13	12
Stu21	8	5
Stu22	7	7
Stu23	5	9
Stu24	7	7

Stu25	7	6
Stu26	10	6
Stu27	7	8
Stu28	5	7
Stu29	9	5
Stu30	6	7
Stu31	6	6
Stu32	9	7
Stu33	8	10
Stu34	11	8
Stu35	6	7
Stu36	7	6
Stu37	7	8
Stu38	8	9
Stu39	7	7
Stu40	8	10

standing long jump score

Student	UHSSW			RHSSW		
	Trial#1	Trial#2	Max	Trial#1	Trial#2	Max
Stu1	1.39	1.44	1.44	1.30	1.31	1.31
Stu2	1.18	1.22	1.22	1.29	1.29	1.29
Stu3	1.29	1.27	1.29	1.31	131	1.31
Stu4	119	1.19	1.19	1.34	134	1.34
Stu5	1.23	1.18	1.23	1.26	123	1.26
Stu6	1.25	1.25	1.25	1.28	120	1.28
Stu7	1.16	1.17	1.17	1.22	127	1.27
Stu8	1.23	1.20	1.23	1.25		1.25
Stu9	1.19	1.21	1.21	1.31	131	1.31
Stu10	1.10	1.15	1.15	1.29	129	1.29
Stu11	1.17	1.21	1.21	1.22	126	1.26
Stu12	1.17	1.17	1.17	1.34	138	1.38
Stu13	1.13	1.18	1.18	1.30	128	1.3
Stu14	1.22	1.21	1.22	1.31	131	1.31
Stu15	1.19	1.17	1.19	1.21	117	1.21
Stu16	1.24	1.22	1.24	1.32	131	1.32
Stu17	1.15	1.20	1.2	1.25	125	1.25
Stu18	1.19	1.22	1.22	1.33	139	1.39
Stu19	1.20	1.16	1.2	1.28	125	1.28
Stu20	1.19	1.14	1.19	1.27	127	1.27
Stu21	1.60	1.61	1.61	1.78	177	1.78
Stu22	1.74	1.72	1.74	1.72	173	1.73
Stu23	1.65	1.61	1.65	1.82	180	1.82
Stu24	1.62	1.66	1.66	1.72	174	1.74
Stu25	1.83	1.79	1.83	1.77	177	1.77
Stu26	1.80	1.80	1.8	1.68	169	1.69

Stu27	1.67	1.68	1.68	1.79	177	1.79
Stu28	1.53	1.58	1.58	1..80	175	1.8
Stu29	1.76	1.76	1.76	1.83	183	1.83
Stu30	1.65	1.65	1.65	1.91	1.90	1.91
Stu31	1.61	1.59	1.61	1.73	1.73	1.75
Stu32	1.62	1.66	1.66	1.80	1.82	1.82
Stu33	1.72	1.70	1.72	1.65	1.65	1.65
Stu34	1.67	1.69	1.69	1.84	1.87	1.87
Stu35	1.62	1.56	1.62	1.73	1.73	1.73
Stu36	1.59	1.55	1.59	1.83	1.85	1.85
Stu37	1.62	1.57	1.62	1.66	1.67	1.67
Stu38	1.64	1.64	1.64	1.78	1.78	1.78
Stu39	1.68	1.70	1.7	1.81	1.82	1.82
Stu40	1.67	1.64	1.67	1.95	1.99	1.99

sit and reach test

Student	UHSSW			RHSSW		
	Trial#1	Trial#2	Max	Trial#1	Trial#2	Max
Stu1	4.6	4.7	4.7	2.5	2.3	2.5
Stu2	1.3	1.3	1.3	2.7	2.7	2.7
Stu3	4.5	4.5	4.5	3.7	3.7	3.7
Stu4	2.3	2.2	2.3	6.2	6.5	6.5
Stu5	5.5	5.5	5.5	-1.5	-1.1	-1.1
Stu6	6.7	6.6	6.7	4.0	4.3	4.3
Stu7	3.7	3.7	3.7	3.5	3.5	3.5
Stu8	2.3	2.3	2.3	3.7	3.7	3.7
Stu9	-1.1	0.8	0.8	3.7	3.6	3.7
Stu10	5.2	5.2	5.2	-2.5	-2.8	-2.5
Stu11	1.7	1.7	1.7	3.7	3.7	3.7

Stu12	1.2	1.2	1.2	2.9	2.9	2.9
Stu13	4.3	4.2	4.2	1.1	1.2	1.2
Stu14	2.1	1.8	-2.1	1.7	1.7	1.7
Stu15	4.3	4.1	4.3	2.2	2.3	2.3
Stu16	1.3	1.0	1.3	2.4	2.0	2.4
Stu17	2.1	2.1	2.1	5.2	5.2	5.2
Stu18	2.7	2.7	2.7	0.8	0.8	0.8
Stu19	-1.5	-1.5	-1.5	1.5	1.5	1.5
Stu20	6.5	6.3	6.5	4.5	4.7	4.7
Stu21	2.2	2..2	2.2	3.5	3.2	3.5
Stu22	0.5	0.5	0.5	0.3	0.7	0.7
Stu23	3.0	3.2	3.2	1.6	1.6	1.6
Stu24	2.3	2.2	2.3	2.7	2.7	2.7
Stu25	2.6	2.5	2.6	1.7	1.8	1.8
Stu26	4.4	4.4	4.4	0.5	0.5	0.5
Stu27	1.6	1.7	1.7	1.4	1.4	1.4
Stu28	3.5	3.3	3.5	2.3	2.5	2.5
Stu29	1.5	1.5	1.5	3.1	3.3	3.3
Stu30	1.3	1.3	1.3	4.5	4.4	4.5
Stu31	2.0	2.4	2.4	2.6	2.5	2.6
Stu32	3.1	3.1	3.1	3.4	3.4	3.4
Stu33	3.4	3.8	3.8	2.4	2.1	2.4
Stu34	2.5	2.5	2.5	3.3	3.3	3.3
Stu35	2.2	2.0	2.2	-1.2	-1.6	-1.2
Stu36	-2.3	-2.3	-2.3	3.7	3.7	3.7
Stu37	1.6	1.3	1.6	1.3	1.3	1.3
Stu38	2.8	3.1	3.1	2.7	2.6	2.7
Stu39	-17	-1.5	-1.5	1.7	1.8	1.8
Stu40	.26	2.6	2.6	-2.5	-2.5	-2.5

Height

Student	UHSSW			RHSSW		
	Trial#1	Trial#2	Max	Trial#1	Trial#2	Max
Stu1	1.65	1.65	1.65	1.42	1.42	1.42
Stu2	1.41	1.43	1.43	1.47	1.47	1.47
Stu3	1.5	1.5	1.5	1.58	1.57	1.58
Stu4	1.44	1.44	1.44	1.46	1.46	1.46
Stu5	1.52	1.52	1.52	1.57	1.55	1.57
Stu6	1.56	1.55	1.56	1.61	1.61	1.61
Stu7	1.41	1.42	1.42	1.56	1.56	1.56
Stu8	1.45	1.45	1.45	1.48	1.48	1.48
Stu9	1.49	1.49	1.49	1.52	1.51	1.52
Stu10	1.55	1.55	1.55	1.44	1.44	1.44
Stu11	1.72	1.72	1.72	1.57	1.57	1.57
Stu12	1.61	1.61	1.61	1.47	1.47	1.47
Stu13	1.53	1.53	1.53	1.66	1.66	1.66
Stu14	1.54	1.54	1.54	1.71	1.71	1.71
Stu15	1.43	1.43	1.43	1.62	1.62	1.62
Stu16	1.49	1.49	1.49	1.46	1.46	1.46
Stu17	1.58	1.6	1.6	1.53	1.53	1.53
Stu18	1.46	1.46	1.46	1.49	1.47	1.49
Stu19	1.45	1.45	1.45	1.46	1.46	1.46
Stu20	1.46	1.46	1.46	1.51	1.51	1.51
Stu21	1.54	1.54	1.54	1.56	1.56	1.56
Stu22	1.51	1.51	1.51	1.59	1.59	1.59
Stu23	1.5	1.5	1.5	1.52	1.52	1.52
Stu24	1.55	1.55	1.55	1.71	1.71	1.71
Stu25	1.56	1.56	1.56	1.58	1.58	1.58
Stu26	1.62	1.62	1.62	1.72	1.72	1.72

Stu27	1.74	1.74	1.74	1.74	1.74	1.74
Stu28	1.7	1.7	1.7	1.75	1.75	1.75
Stu29	1.63	1.63	1.63	1.69	1.69	1.69
Stu30	1.59	1.59	1.59	1.66	1.66	1.66
Stu31	1.6	1.59	1.6	1.69	1.69	1.69
Stu32	1.64	1.64	1.64	1.67	1.67	1.67
Stu33	1.55	1.55	1.55	1.58	1.58	1.58
Stu34	1.56	1.56	1.56	1.63	1.63	1.63
Stu35	1.61	1.61	1.61	1.65	1.65	1.65
Stu36	1.54	1.56	1.56	1.69	1.67	1.69
Stu37	1.62	1.62	1.62	1.68	1.68	1.68
Stu38	1.57	1.57	1.57	1.75	1.75	1.75
Stu39	1.56	1.56	1.56	1.77	1.77	1.77
Stu40	1.61	1.61	1.61	1.67	1.67	1.67

Weight

Student	UHSSW weight			RHSSW weight		
	Trial#1	Trial#2	Max	Trial#1	Trial#2	Max
Stu1	44	44	44	43	43	43
Stu2	45	45	45	44	44	44
Stu3	50	50	50	51	51	51
Stu4	48	48	48	52	52	52
Stu5	52	53	53	47	46	47
Stu6	54	54	54	53	53	53
Stu7	49	49	49	50	50	50
Stu8	55	55	55	53	53	53
Stu9	53	53	53	49	49	49
Stu10	59	59	59	51	51	51
Stu11	47	47	47	53	53	53

Stu12	58	58	58	47	47	47
Stu13	51	51	51	59	60	60
Stu14	56	56	57	55	55	55
Stu15	50	50	50	51	51	51
Stu16	60	60	60	57	57	57
Stu17	61	61	61	45	45	45
Stu18	63	63	63	59	59	59
Stu19	59	59	59	55	55	55
Stu20	46	46	46	48	48	48
Stu21	46	46	46	48	48	48
Stu22	48	48	48	51	51	51
Stu23	51	51	51	47	47	47
Stu24	46	45	46	47	48	48
Stu25	47	47	47	55	55	55
Stu26	47	47	47	51	51	51
Stu27	49	49	49	49	49	49
Stu28	45	45	45	50	50	50
Stu29	53	53	53	51	51	51
Stu30	56	56	56	53	53	53
Stu31	51	51	51	52	52	52
Stu32	55	55	55	46	46	46
Stu33	51	51	51	53	53	53
Stu34	50	50	50	57	57	57
Stu35	58	58	58	56	56	56
Stu36	49	49	49	49	49	49
Stu37	52	52	52	58	58	58
Stu38	50	50	51	61	61	61
Stu39	46	46	46	57	57	57
Stu40	61	61	61	52	52	52

BMI

Student	UHSSW BMI	RHSSW BMI
Stu1	22.8	17.6
Stu2	22.5	23.6
Stu3	21.3	18.8
Stu4	26	22.5
Stu5	21.2	22.3
Stu6	21	19.7
Stu7	20.3	20.1
Stu8	22.3	22.8
Stu9	23	22.1
Stu10	18.7	20.6
Stu11	20.6	21.1
Stu12	20.4	21.3
Stu13	23.5	19.2
Stu14	21.1	19.5
Stu15	21.9	21.3
Stu16	20.7	23
Stu17	21.8	24.8
Stu18	22	21.4
Stu19	23.3	26.7
Stu20	24.3	22.8
Stu21	19	17.7
Stu22	19.7	17.4
Stu23	22.2	22.1
Stu24	20	17.8
Stu25	21.8	18.8
Stu26	20.6	18
Stu27	19.8	16.5

Stu28	19	18.6
Stu29	19.9	17.2
Stu30	23.3	18.5
Stu31	18.4	18.6
Stu32	21.7	16.9
Stu33	21.2	19.2
Stu34	23.4	20.7
Stu35	19.2	18.7
Stu36	20.1	18.6
Stu37	19.7	16.2
Stu38	19.1	19.3
Stu39	24.2	19.7
Stu40	17.7	19.2