**ADDIS ABABA UNIVERSITY**

**SCHOOL OF GRADUATE STUDIES**

**COLLEGE OF EDUCATION AND BEHAVIORAL STUDIES**

**DEPARTMENT OF SCIENCE AND MATHMATICS EDUCATION**

# Investigating the relationship between Practical teaching of PE and academic achievement in Selected Fitness Components: the Case of Guji Zone Secondary Schools in Oromia Regional State

**BY**

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This is to certify that the thesis prepared by Dubale Abebe, entitled: ***Investigating the relationship between practical teaching of physical education and academic performance in selected fitness components: the case of Guji Zone secondary schools in Oromia Regional State.*** And Submitted in partial fulfilment of the requirements for the Degree of Master of Education in physical Education complies with the regulation of the University and meets the accepted standards with respect to originality and quality.

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# ABSTRACT

Investigating the Relationship between Practical Teaching of Physical Education and Academic Achievement in selected fitness components: The case of Guji Zone Secondary Schools in Oromia Regional State

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*The study was intended to investigate the relationship between physical fitness as an outcome of practical teaching of physical education and academic performance of secondary school students of Guji Zone of Oromia Region. The research design was a descriptive survey. The total sample of the study was 348 high school students. Of those* 183 *were male and* 165 *were female. Thus students were selected randomly from* Adola woyu, Boke Bulala, Megado, shakiso and Yirbamuda *selected by using clustered sampling from Guji Zone. The data was collected from students' average academic result and Health related physical fitness tests. The instruments used in this thesis includes sit and reach test, push-up test, curl-up test, one mile run test and body mass index test. A descriptive statics, mean, standard deviation, minimum and maximum were used. To know the relation Bi-varate correlation and an independent t-test were used.*

*Relationships between the variables were determined by Spearman correlation coefficients. The results showed a significant correlation between physical fitness and academic performance in the total group and between several fitness variables such as one mile run test, push up and academic performance in the female group. Significant correlations were also found between strength tests and academic performance among girls. The mean of academic achievement of physically fit participants was significantly greater than physically unfit participants. Several fitness parameters discriminated between high and low academic achievers. A positive relationship between physical fitness components and academic achievement was found with more significant correlations among girls than boys.* The mean difference between the two group is 6.137 at p-value 0.000. This implies that the difference in means is statistically significant at the p-value = 0.05 levels. Here, we can conclude that physical fitness and academic achievement have a direct relationship. As fitness level increases, academic achievement also increases. *Indeed, the study recommended that an appropriate instruction in physical education is essential to enhance students' participation in physical practice to build students' physical fitness and hence, promote their academic performance.*



***Key words:*** *Physical fitness; Academic achievement; Physical Education; sport, endurance, flexibility*

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## List of Acronyms and Abbreviations

ACSM - American College of Sport Medicine

ASC - American School Curriculum

BMI - Body Mass Index

CDE - California Department of Education

NASPE - National Association for Sport and Physical Education

PFT - Personal Fitness Test

SAT - Scholastic Aptitude Test

SES - Socio-Economic Status

# CHAPTER ONE

# 1.INTRODUCTION

This chapter deals with discussions of key concepts used in this study, an overview of the background, statements of the problem, basic questions, objectives, and significance of the study, delimitation of the study, limitation of the study and definition of terms are included.

## 1.1. Background of the Study

Academic achievement and physical performance are the intertwined phenomenon both are the manifestation of human endeavour, so it is possible a being to have the two variables at the same time due to their intertwined nature. Beyond the interlocking nature of the aforementioned variables, in a logical sense physical proficiency is precondition to have academic achievement. In the earthly life of the being, the aforesaid variables have equal value for the existence of a being to foster its life. The endeavour of a being is to be successful in this material world, to render and to make the intelligibility practical, the two variables should be developed hand in hand; regardless of other constraints, if not the ground is convent to do so physical proficiency should be the prerequisite to the academic achievement (Tremblay, Inman & Willms, 2000). But as of the researcher of this study experience, learners in the school wouldn't be understood the aforementioned argument due to this, their inclination always take a side of one to the other, to underpin the argument, the researcher of this study supposed by the work of certain thinkers, authors and so on in the following manner.

Education is a consciously and deliberately planned, organised, directed and evaluated process of personality formation, where personality is defined as the sum total of physical, mental, social, emotional, moral and aesthetic aspect of the individual. It is a complicated process that brings various facets into the play. As it widely accepted, the function of education is the construction and distribution of knowledge. Thus, the construction and distribution of knowledge, implies consciousness, ethical commitment and due participation

so that, the knowledge constructed can be of concrete benefit to the participants of the educational system (Childs-Bowen, 2000).

Physical education program is a learning process designed to foster the development of motor skill, health related fitness, knowledge and attitudes relative to physical education through a series of carefully planned and conducted experiences (Chappell, 2001). The learning environment is thoughtfully structured to enhance the overall development of each student within the true learning domain: psychomotor, cognitive, and affective. These learning experiences help students understand how human move and execute movements safely, efficiently, and effectively. These experiences are conducted in such a way as to promote positive feeling towards oneself as a mover and an appreciation for the contribution that physical activity can make to ones quality of life (Wuest and Lombardo, 2001).

Over the past three decades of time, several reviews and meta-analysis have described the relationship between physical fitness and all mental processes. The majority of these studies have focused on the relationship between academic performance and physical fitness. More recently, studies have attempted to describe the effects of an acute or single physical activity as behaviour on academic performance. Regular participation in physical activity is also a national learning standard, a standard intended to facilitate the establishment of habitual and meaningful engagement in physical activity (NASPE, 2004).

Physical fitness has been associated with a variety of health benefit in both adults and children. Being physically fit reduces the risk of cardiovascular diseases, type2 diabetes and obesity and improves psychological variables, including depression, anxiety and stress. In addition to its impacts on health, physical fitness results with improved brain function, cognition and academic achievement (Hillman, Erickson & Kramer, 2008). Aerobic fitness has been associated with increased blood supply to the brain, increased brain mass and improved synaptic transfer in adults. Short term and long terms effects of improved cardio respiratory fitness may included a reduction of depression and

an increase in self esteem. These effects may lead to a positive relationship with academic performance (Sigman, 2008).

According American Journal of Play cited in Pollock (2009), the quality of physical education is vitally important to cognitive and academic outcomes. As a result, physical activity predicts higher academic performance, but physical education with insufficient level of activity does not. This suggests that the evidence relating physical education to academic outcomes has been limited by the quality of the programs under investigation. Thus, it is likely that the potential academic benefit of daily, quality physical education has been underestimated. Animal and human research primarily supports the importance of aerobic activity to enhance cognitive function. Those physical education classes that fail to encourage sufficient duration and intensity of aerobic activity are unlikely to make notable improvements in fitness, health, weight control, or academic achievement.

Kim (2003) evaluated the association between physical fitness and academic performance in a representative sample of just under 6,500 Korean boys and girls in Grades 5, 8 and 11. Based on the standardized fitness scores, the performance in sprinting, long distance running, standing, long jump, chin-ups and throwing were positively correlated with students' grade point average. The squad multiple correlation for the fitness parameters between grade 5 and grade 11 showed an increase in comparison with socio-economic status variance in grade point average.

Physical fitness has been directly correlated with improved academic performance. A cross-sectional study conducted in 2002 by the California Department of Education demonstrated a strong association between physical fitness and academic performance (CDE, 2005).

Locally, Aklilu Seifu(2014) conducts a study on the Relationship between Physical Fitness and Academic Achievement: The Case of Model School Students at Haramaya University, Ethiopia showed that the correlation coefficient of experimental group on muscular strength, and flexibility showed moderate significant positive correlation with academic performance. On the

other hand body composition had moderate significant negative correlation. With the exception of the cardiovascular endurance and muscular endurance results showed very high significant positive correlations with academic performance among the experimental group. The study proved that there is a significant relationship between physical fitness and academic achievement. In line with this evidence, investigating the relationship between physical fitness and academic performance will shed light on the potential role that physical education has on the learning abilities and academic outcomes of students. It may contribute to a new, positive perception of physical education and its implementation in Guji Zone. Therefore, the study is intended to determine the relationship between physical fitness as learning outcome of physical education and academic achievement in the Guji Zone Secondary School students.

## 1.2. Statement of the Problem

The practice of teaching physical education at school has long been confined to the specific content of the subject, and giving little emphasis to the basic knowledge that necessitates the provision of physical education program. The teaching of physical education has long been accompanied with traditional method of instruction that diminished the educational outcome that students should gain in their life-long learning. The focus of the instruction on specific development of skill and routine practice of teaching has imposed a big burden in promoting the educational value of physical education program (Lumpkin, 2005).

In comparison to other school subjects, physical education has been considered to be the least important subject at school. The subject has received little value within the lists of the academic subjects, which are perceived to determine the success and fate of the students in their future schooling. Lack of awareness on the contribution that school physical education render has threatened its academic status and purpose in various areas of learning. Due to this, the primary intention of school physical education program has gone through a series of obstacles with limited value and contribution to pupil.

A study conducted by Aklilu Seifu(2014) on the Relationship between Physical Fitness and Academic Achievement: The Case of Model School Students at Haramaya University, Ethiopia showed that the correlation coefficient of experimental group on muscular strength, and flexibility showed moderate significant positive correlation with academic performance. On the other hand body composition had moderate significant negative correlation. With the exception of the cardiovascular endurance and muscular endurance results showed very high significant positive correlations with academic performance among the experimental group. The study proved that there is a significant relationship between physical fitness and academic achievement. The study was conducted at higher education level but the current study was conducted at Guji zone secondary schools this is the gap. The other gap is a study conducted by Aklilu Seifu was used a quasi experimental design but my study was used a descriptive design, this is also another gap to conduct the current study. Therefore, the primary intention of the study is to determine the relationships between practical teaching of physical education and academic achievement in Guji Zone Secondary School students.

## 1.3. Research Questions

The study attempts to address the following basic research questions.

1. What does the relationship between physical fitness and students' academic performance look like?

2. Is there a significant difference between selected fitness components tests with academic results among students?

3. What does the result in academic and physical fitness tests of participants (female and male students) look like?

4. Do physically fit students or physically unfit students score high academic results in Guji Zone Secondary Schools?

## 1.4. Objectives of the Study

### 1.4.1 General Objective

The general objective of this study is to investigate the relationship between practical teaching of physical education and academic achievement of secondary school students of in Guji Zone of Oromia Region.

### 1.4.2 Specific Objectives

Specifically, the study attempts:

- To show if there is a significant relationship between physical fitness and students academic performance.
- To identify the relationship between selected fitness components with academic results among students.
- To compare result in academic and physical fitness tests of participants (female and male students).
- To determine whether physically fit students or physically unfit students score high academic results.

## 1.5. Significances of the Study

This study will have the following main significance.

- The study might provide significant information on the relationship between physical fitness and academic performance of students.
- The study might be useful for school administrators, educational experts and policy makers so that they can consider the effective provision of physical education to enhance students' academic performance.
- The study might serve as a stepping ground/clue for researchers, educational offices, and NGOs to conduct further study in the topic.

## 1.6. Delimitation of the Study

The research study has two delimitations: the conceptual and geographical delimitation. The study was only concerned to the investigation of the relationship between physical fitness as a learning outcome of practical teaching of physical education and academic achievement of students. The geographical delimitation of the study is the Oromia Regional State of the Guji Zone Secondary Schools. Data for the study were gathered from selected populations that are within the range of study area. The results that are obtained from the study are only pertinent and functional to the geographical area and the specific topic of the study.

## 1.7. Limitations of the Study

The most serious limitations are lack of local reference materials, and other resources, including related researches in our context. Besides these, while conducting this study, the researcher encountered some limited factors that can affect the quality of the research work. This includes financial and time constraints, lack of local reference materials, and other resources, including related researches in our context. Since the researcher is novel researcher he faced the challenges to select the appropriate statistical analysis method to answer the research questions. However, the researcher made smooth relation with his respondents, try to find all local references and search other materials to make the study as complete as possible.

## 1.8. Definitions of Terms

**Physical Education:-** for the purpose of this study, physical education is part of schools' curriculum that teaches to the whole child and provides fitness assessments to the children to show their current fitness levels and provide ways to improve those levels and the process by which an individual gains optimal skills through some type of activity (Lumpkin, 2005).

**Physical fitness**: is general state of health and well-being and more specially the ability to performance aspects of sport or occupations. The state of general well-being, physically, sound and healthy, along with mental stability (Darla, Castelli and Chares, 2000).

**Academic achievement**: is the outcome of education the extent to which students, teachers or institutions have achieved their educational goals (Tremblay, 2000).

**Disability:** is a functional limitation with in an individual caused by physical, mental or sensory impairment.

**Gender:** is the range of characteristics pertaining to, and differentiating between, masculinity and femininity.

Is the state of being male or female (typically used with reference to social and cultural differences rather than biological ones).

## 1.9 Organization of the study

This research work is prearranged in five broad chapters. Chapter one deals with introduction, statement of the problems, research questions, objectives of the study, significance of the study, delimitation of the study, limitations of the study, definition of terms and organization of the study. Chapter two is about review of related literature. Chapter three deals with research design (method) and methodology. Chapter four deals with analysis and interpretations of data collected. And finally the last chapter involves summary, conclusions and recommendations provided by the researcher.

# CHAPTER TWO

# REVIEW OF THE RELATED LITERATURE

This chapter is highly concerned with the presentation of a review of related literatures from different scholars on the relationships of physical fitness and academic performance. The chapter deals with the historical development of physical education importance of physical education the benefits of physical fitness physical fitness as a learning outcome of physical education and its relation to academic performance characteristics of quality physical education

## 2.1. Historical Development of Physical Education

Physical education ranks to historically the oldest elements of education. It start with the beginnings of the development of man, when motion was a social phenomenon conditioned by material conditions, vital for the preparation of man for fight and motional fitness was an evolutional selective impulse (Jurkechova, Vlcek, & Bartik, 2011). Physical activity has been around for long time and the Greek culture took physical activity to another level by incorporating it into games known as the Olympics. Olympics were events where athletes show off their physical fitness in sporting activities by competing against one another. Since the Olympics started, physical fitness is considered to be the backbone of physical education in today's school systems (Lumpkin, 1986).

Since that time, civilizations and cultures throughout Europe have constantly contributed to the development of physical education. The European legacy of athletics, gymnastics, and sports laid the foundation for the physical education programs in the world. Because of the popularity of the gymnastics in Europe, people in other parts of the world began to become more concerned about their health. As provisions were made in public education to educate more and more children, schools placed emphasis on reading, writing, and arithmetic, and showed little interest in physical education (Bishop, 2005).

Since then, physical education began to become a topic of discussion in public education. It was not long after that physical education was mandated to be a

curriculum in schools. After this mandate, physical education became part of the curriculum for many secondary schools, as well as several colleges. As a result of this taking place, early physical education program underwent a transition from recreational sports and games to organized school and college programs that emphasized one system of gymnastics or combination of other exercises that promoted wellness (Bishop, 2005).

With this transition taking place, physical education was endorsed in schools to inform the people about the importance of children being physically fit. Therefore, physical education programs became popular in school curricula, and with this popularity, children were eager to participate. With this new acceptance, many state educational systems now understood the importance of physical education and the need for the students to be physically fit and stay fit during their lives (Palmer & Bycura, 2014).

When first started, physical education class was not considered to be a part of the regular curriculum; instead, it was considered as co-curricular class. Physical education class was separated from regular education classes, such as language arts, mathematics, and science, and viewed as a special area of education. Originally, educators thought physical education class had little/no relationship with other academic areas. Instead, activities during physical education class were to promote fun and provided a type of physical release that helped children to get their minds away from content area learning tasks (Garn & Cothran, 2006).

As more researches were being done on physical fitness, people began to think differently about the concept of physical education class. These researches began to show how physical education class helped develop the whole children through providing cognitive, social, and physical benefits (Robinson & Graham, 2007). During the 19th century, physical education class was viewed as an important portion of the mind and overall health maintenance. As a result, it was believed that physical education class could contribute to the emotional, social, mental, and physical development of children so that they might become more well rounded adults and contributing citizens (Jackson & Morrow, 2007).

Physical education class today is recognized for its effectiveness in helping to provide the activities through physical activity that can yield preventive health benefits throughout a person's lifetime. With this effort now taking strides to boost children's physical activity, it was more likely that physical education curricula will develop accordingly. This is evident in the past few years with many states now mandating that children participate in physical education class. With this mandate in place, physical education program aimed for students to take part in regular physical activity, understand the health benefits from participation, and become physically fit (Meredith &Welk, 2009).

## 2.2. Importance of Physical Education

Not only does physical education help develop the whole child, it also helps with cognitive function. The physical education curriculum plays a major role in providing diverse benefits to both the body and mind. Physical education class allows the student to become physically active which can lead to having a healthy body. Children's favourite way to learn is through movement. The brain has the capacity to improve by performing regular exercises and being physically active. Having a healthy body can have an effect on cognitive development; thus, a healthy body leads to a healthy mind (Bailey, 2006).

With regular participation in physical activity during the early years and mid-years of life, there is less of a decline in brain function and brain decay. Along with physical education providing a healthy body and healthy mind, there are goals physical educators are aiming to accomplish. One goal of a physical education curriculum should be to provide the student with activities that could impact their lives. Physical education program could contribute to making the student a successful member of society. Ultimately, physical education should increase one's quality of life through physical, mental, and social benefits (Ratey, 2008).

Another goal of physical education is to help students in the development of skilful motor movements. Having the confidence to perform a skill with proficiency leads to a lifetime of physical activity. With improvement and a general understanding of a specific motor skill, children can take that skill with

them into adulthood and sustain a physically active lifestyle. Children will stay active as they enter adulthood as long as they have a type of activity they feel comfortable performing. As an individual becomes more comfortable with a skill or activity, they are considered to be physically literate (Weinstein & Erickson, 2011).

Physical literacy encompasses the development of fundamental movement and skills and the sport skills that permit children to move confidently and with control, in various physical activity, rhythmic (dance) and sport situations. Children who feel confident in their abilities are more likely to take part in more physical activity, but children who do not feel confident in their skills are not likely to be involved. Efficient physical movement should begin early in children's lives; therefore, it will move on with them later in life. By preparing students to become physically active, it may greatly benefit not only their present lifestyles, but also their future lifestyles (Overdorf & Coker, 2013).

Physical activity is a necessity for our children's present and future health, and school is the prominent environment for providing any type of physical activity to children. If physical activity is not taught to children in physical education class, there is a chance of children becoming inactive which can lead to unhealthy weight gain. Being physically active can provide individuals with healthy bodies, active lifestyles, and ways to change their current health practices for the better. Physical activity has also demonstrated a positive effect on a neurotrophic factor in the brain (Hart & Jelalian, 2006).

## 2.3. The Benefits of Physical Fitness

### 2.3.1. Physical Benefits

Getting individuals to participate in regular physical activity is the main goal of school physical education program that promote healthy lifestyles. One strategy this program could try is to show how physical education class is important for the success of school districts and for the overall achievement of the child. When children receive regular physical activity during their childhood, it helps to develop their motor skills. When children develop good motor skills at an early age, it gives them the ability to carry these skills into adulthood children learn a majority of their motor skills and how to be

physically active during their time spent in physical education class (Pesce, Faigenbaum, Crova, Marchetti & Bellucci, 2013).

For many children, the only physical activity they may participate in is during physical education class. Physical education class taught by skilled physical education teachers gives the required skills for child to develop habits for an active lifestyle. By choosing a lifestyle with physical activity incorporated into it, children can expect a longer and better quality of life. Physical activity gives children a better quality of life because it reduces certain risks of developing various diseases and can guard against death at an early age. Being physically active can also help prevent the onset of diabetes, low blood pressure, promote bone growth, and decrease unhealthy weight (Bailey, 2006).

Along with helping the child's physical well being, participating in physical education class provides the skills children need to lay the groundwork for most sporting activities. If a strong foundation is made with the basic movement skills through sports, children are more likely to be active as a child and on into the adult years allowing them to live a long and healthy life (Bailey, 2006).

### 2.3.2. Psychological Benefits

Along with providing many physical benefits, such as decreasing unhealthy weight gain, fighting against diabetes, helping bones grow and lowering blood pressure, being physically active on a regular basis can also contribute to the betterment of a children's psychological health. The main psychological factor is in relation to a child's self-esteem. Self-esteem is very important for the success of children. As well as providing an increase in a child's self-esteem, being physically active can help to reduce stress, anxiety, and depression. Physical education class can help with school attendance and often reinforces children's attitudes toward school (Bailey, 2006).

Children that are otherwise not interested in school, suddenly find themselves wanting to go to school so that they can participate in physical education class (Bailey, 2006). As children continue to participate in physical education class, other psychological benefits can emerge positively. The development of these

skills is shown in moral reasoning, sportsmanship, and responsibility. These traits are developed because when children encounter situations that result from competition, physical education teachers and coaches can guide the students through the situation and teach them how the handle it appropriately (Bailey, 2006).

### 2.3.3. Academic Benefits

It has been suggested that there is a link between physical activity and cognitive function. Although research on this subject matter had not been thoroughly conducted, the original research that determined the relation between physical activity and academic achievement was performed in France in the 1950s. The results from the study showed that the children's achievement did not worsen; however, attentiveness was improved, and discipline problems declined throughout the school. Since then, the researchers have taken notice of the benefits associated with physical activity, especially dealing with cognitive function (Bailey, 2006).

With more and more benefits becoming known, educators needed to take notice of the importance of physical education class. However, with all the new advances in technology, more and more children are becoming less active. For some children, the only form of physical activity they may get is during physical education program while at school. When children participate in a physical education class, it gives them the privilege to be physically active. Physical activity can provide physical benefits such as better health and increased levels of energy (Greer & Gilbert, 2006).

Along with researches showing a relationship between physical fitness and achievement of students, movement has many benefits for the brain. Movement that causes flow of blood throughout the body to increase and with the increased blood flow, there is more oxygenated blood carrying nutrients to neurons and other parts of the brain. Physical activity can also increase the production of dopamine, allow for nerves to grow, and increase the production of new brain cells. These new brain cells can improve learning, memory, and a student's mood, alertness, and self-esteem (Jensen, 2008).

## 2.4. Physical Fitness as a Learning Outcome of Physical Education and its Relation to Academic Performance

Achieving and maintaining a healthy level of aerobic fitness, as defined using criterion-criterion referenced standards from the health and nutrition examination survey, is a desired learning outcome of physical education programming. Regular participation in physical activity is a desired learning standard for physical education, a standard intended to facilitate the establishment of habitual and meaningful engagement in physical activity. Yet although physical fitness and participation in physical activity are established as learning outcomes, there is little evidence to suggest that children actually achieve and maintain the desired standards (NASPE, 2004).

From an academic performance perspective, longitudinal data on men who enlisted for military service imply that cardiovascular fitness at age 18 predicted cognitive performance in later life thereby supporting the idea of offering physical education and physical activity opportunities well into emerging adulthood through secondary and postsecondary education. Aerobic fitness, then, may be important to academic performance, as there may be a dose-response relationship. In sum, numerous cross-sectional and co-relational studies demonstrate small to moderate positive association between physical fitness, particularly aerobic fitness and academic performance (Chin & Chen, 2011).

There are many studies attempting to correlate physical fitness with academic achievement, primarily in school. This can be a difficult correlation to test but it can be done. Researchers use the *FITNESS GRAM* to assert students' physical fitness. The *FITNESS GRAM* provides a number of options for each performance task so all students, including those with special needs, have the maximum opportunity to complete the test. The personal fitness test (PFT) measures five aspects:

1. Aerobic capacity
2. Body composition
3. Trunk strength

4. Upper body strength, and
5. Flexibility

The *FITNESS GRAM* requires the students to complete the following six tests: one of the options from aerobic capacity, one of the options from body composition, the curl-up test, the trunk lift test, one of the options from upper body strength, and one of the options from flexibility (Grissom, 2005).

There are a lot of investigations that have been conducted in developing countries. In a study involving a national sample if Australian children aged 7 to 15 years, the study found significant correlations between ratings of academic performance and the one-mile run, timed sit-up and timed push-up test. The result of the study reports a significant association of physical fitness to academic performance. In the study, Body Mass Index (BMI) and physical activity were two of the health components explaining up to 24% of the variance of academic achievement (Sigfudottir, Kristjansson & Allegrante, 2007).

Body composition, most commonly reported as BMI, is a health-related physical fitness component which has been shown to have a significant negative correlation with academic performance in children in several large-scale studies involving children of different ages. However, BMI has been identified as a marker rather than a causal factor after including the socio-economic and other behavioural variables. In addition, the problem of overweight is most regularly associated with decreased cognitive functioning among school-age children and adolescents (Li, Dai, Jackson & Zhang, 2008).

## 2.5. The Relationships of Physical Activity, and Academic Performance

A positive relationship of physical activity and academic performance has been explored through several studies conducted in the USA by the California department of Education; Linder (2002), Dwyer et al. (2001) and Tremblay, (2000) as they researched , their finding support one another in suggesting that when a substantial amount of school time is dedicated to physical activity academic performance meets and may even exceed that of students not

receiving additional physical activity (Shephared, 1997) . As Debby Mitchell consolidated that relation of physical activity with academic achievement he said that children are having fewer opportunities to physically active and develop basic motor skills that will chance children academically (aforementioned authors by CDE 2005). As Mitcheel performed a study on the relationships between rhythmic competency and academic performance, in first grade children (1994),the findings supported a link between academic achievement and the motor skills of maintaining a study beat (Mithcheel, 1994). As of Tremblay as he discussed that Youth receiving additional physical activity tend to show improved attributes such as increased brain function and nourishment higher energy / concentration levels changes increased self-esteem and better behaviour which may all support cognitive learning (Tremblay, 2000).

As Shephard stated that improved brain attributes associated with regular physical activity consist of increased cerebral blood flow; changes in hormone levels enhance enduring intake, and greater arousal (Shephard, 1997). Studies presented at the 2002 society for neuroscience by Linder suggest that regular exercise can improve cognitive function and increase levels of substance in brain responsible for maintaining the health of neurons " Brain function any also indirectly benefit from physical activity due to increased energy generation as well as form time out side of the classroom may give relief from boredom resulting in higher attention levels during class room instruction (Linder, 2002). In order to cross check the correlation of physical fitness and academic performance CDE (California Department of Education) has been conducted a research on the six fitness standards included in the fitness gram are cardio vascular endurance, body composition , abdominal strength , endurance, trunk strength , flexibility, upper body strength , endurance and overall flexibility (CDE, 2005) . Results of the CDE (2005) study included " Statistical analysis indicating a distinct and linear correlation between students academic achievement and fitness scores" in all three grades 9th 10th and 11th higher academic performance was positively related to higher levels of fitness with the greatest academic gains in students who met there or more physical fitness

standards . This association was greater in mathematics than in reading additionally females demonstrated higher academic achievement at higher fitness levels than the males (Dwyer et al., 2001)

## 2.6. Physical Fitness and Academic Achievement

As the CDE announced that the relationship between physical education (fitness or activity) and academic achievement received much attention owning to the increase prevalence of children who are overweight and unfit as well the in escapable pressure on schools to produce students who meet academic standards (CDE,2005). A study examined by 259 public school students in 7th and 8th grades found that field tests of physical fitness were positively related to academic achievement specifically aerobic capacity was positively associated with academic achievement, whereas BMI was inversely related, associations were demonstrated in total academic achievement like mathematics and reading, thus suggesting that aspects of physical fitness may be globally related to academic performance in pre adolescents (Darla, Castelli and Chares, 2000). As the CDE, broadcasted that Educational and Health professionals have intuitively believed that individuals who are physically active and fit perform better in school, So in relation the two variables several studies have documented a positive relationship between physical fitness and academic achievement or other cognitive performance measures (CDE, 2005). As studies showed that exercise can increase standardized test scores, like Mathematics, language and physics, as Sigfusdottir, stated that body mass index and physical activity were responsible for as much as 24% of all differences in academic achievement (Sigfusdottir et al., 2007). According to ASC, as it stated that evaluation of nearly one million students in grades 5 through 12 found that those adapted with higher levels of physical fitness (particularly acerbic capacity ) achieved higher scores on standardize tests, this effect was strongest for mathematics tests (ASC or American School of Curriculum, 1996).

Shephard (1997), found that reducing academic class time by 240 minutes per week and replacing it with physical activity increased scores on standardized math tests. As different authors suggested that physical education should be

reformed to produce academic benefits. As studies Measuring physical fitness or time spent exercising constantly find that exercise improves academic performance. However increasing time spent traditionally physical education classes will not necessarily produce academic benefits for the following reasons.

 Traditional physical education, with its team sports orientation, often has students standing around or sitting and waiting for much of the time.

 A study conducted by D.P. Coe, (2006). found that on average, among a number of physical, education classes studied, students participated in just 19 minutes of vigorous physical activity per class, and many students dislike team sports or find exercising with others stressful, those who are not natural athletes are often marginalized by traditional physical education approaches and being forced to participate can cause some students to develop a lifelong a version students to develop a lifelong a version to all physical activity (Coe, 2006).

## 2.7. High School Sports and Its Impact on Academic Achievement

As Aries E.& McCarthy D(2004). suggested a number of studies over the years have gone beyond finding only non-cognitive advantages of participation in sports, and argued that there is a direct correlation between participation in high school sports and student's academic success, (While in the context of the, “Us-versus – them “character of the current climate of athletics versus academics such a finding would appear to be counterintuitive, a strong literature has developed in support of the claim (Aries and McCarthy, 2004).

In a study at Hardiness Research in 2006, it was made by ACSM, found that by a 2-to-1 ratio boys who participate in sports do better in school, do not drop out and have a better chance to get through college”, for girls, the ratio is three to one. A study by the women's sport foundation in 1989 also found that; “High school athletic participation has a positive educational and social impact on many minority and female student” (ACSM, 2006). The ACSM also issued a report indicating that the “dumb jock” stereotype is actually a myth and that student- athlete boy's drop out less than non-athletic boys, a study of high

schools in ACSM, it was found that those which had success on the playing field also experienced success in standardized tests, and again a study in school counsellor magazine ACSM on 123 soccer students found that “active participation … may enhance academic performance, and this is also supported by another study called extracurricular participation and student Engagement”, which revealed that during the first semester of their senior year, participants reported better attendance than their non- participating classmates “. Moreover, “ Students who participated were three times as likely to perform in the top quartile on a composite Mathematics and reading again assessment compared with non- participants is in a better position” , and a study in North Carolina found “a strong correlation between participation in athletes and positives such as improved grades and increased attendance rates “ (ibid). According to Comeaux E. a number of empirical studies exist that attempt to predicate whether or not student athletes will be successful in school, Some studies look at, Demographic, factors, and others environmental factors influencing success, most of the Studies are done on the collegiate level as Comeaux, found that when student athletes receive a lot of input from advisers and when they study in a supportive environment, their academic achievement will be high. Here recommends “a wide range of forms of faculty communication and mentoring that are responsive to the needs of male student- athletes of different abilities”. Mentoring of student – athletes by faculty has also been found to be helpful. One approach to solidifying the link between athletics and academic achievement involves looking at both as part of the development of the talent of a student (Comeaux, 2002).

According to Oliszewski K. as he explained, what it takes to assist in the development of a student- athlete is to make sure that the class is immediately; enjoyable to him or her, and develop in the long-term goals, the basis of this approach to the student – athlete is the study of eminent individuals that finds outside –of-school or extracurricular activities “plays a more pivotal role in talent development than school- based programs” ,and Participation in extracurricular activities is also said to increase the parent's social capital and therefore their ability in “obtaining appropriate educational resources and addition opportunities for their children” (Oliszewsk, 2004).

Most importantly, however, research shows that children participate in extracurricular activities because these activities present them with a level of challenge not found in classrooms. They often make friends and become more connected at school too, as a result of participation, and Others report that during extracurricular activities, including sports, they also learn time management and other skills Which enhance their abilities with regard to academics, Overall, then, the conclusion of this literature is that students gain much from participation in sports, which cumulatively and positively Impacts academics however , in the study of gifted students, while it was found that their giftedness apparently buoyed by participation in extracurricular activities, as they were more likely to be involved in a variety of high school extracurricular activities compared to students with lower test scores ,however, this did not include athletics, cheerleading and vocational activity that gifted children appear to participate in are related to their hobbies, and most often involving writing, drawing and mathematics, other qualifications of these findings with regarded to gifted students is that all adolescent participation in sports declines in high school with girls in particular moving in academic clubs and activities, these changes in participation levels are also true for gifted students. One twist however relates to the motivation of gifted students to be noticed for their work and receive awards for academic accomplishment and it is conjectured that gifted students may seek out recognition because they are vulnerable to peer pressure due to their superior abilities this motivation may be even more pronounced in schools where an anti- intellectual atmosphere is prevalent (OliSZewski, 2004). This latter finding provides the rationale for an additional argument in how sports lead to stronger academic, but in a negative way (ibid). A more positive, but equally circuitous route to provide that sports improves academics is provided by those researchers who note that sports serves as a marketing tools to attract better students to a school, including students with higher test scores, in this stream of research, athletics is linked to graduation rates, and found to be beneficial to the overall graduation rate of the school. But this is because a strong sports program creates a high level of prestige which in turn attracts a higher caliber of student, academically speaking, to the institution. Moreover, higher levels of academic success create

a larger disparity between student- athlete and under graduate graduation rates" at the college level, how sports contributes to this is relative however, as "although athletes have higher graduate rates than all other undergraduates for the entire sample, pressures to succeed athletically compromise, their relative academic standing compared to other students, this kind of indirect argument suggests a linkage between sports and academics, but acknowledges that the level of achievement, measured by graduation rate alone, is relative to the level of academic achievement of the non- athletic student body (ibid).

According to Aries E. & McCarthy D(2004). as they argued that, most studies seeking to find a direct connection between participation in sports and academics are faced with the problem of time and demand, in this regard studies have shown that the time demands of athletic programs force student-athletes to sacrifice attention to academics, making it difficult for them to devote time to study or earn good grades but this doesn`t mean there is no any connection between the academic circle and physical efficacy, this problem is exacerbated if the student was granted some form of scholarship that overlooked his or her "less impressive academic records" or if they play in one of the high- profile money sports like basketball or football (Aries & McCarthy,2004).

Studies on the college level have also shown that as student- athlete's move through college, the gap between their level of academic achievement and that of the non-athletic student increases, still other studies have found that student- athletes also underachieve outside the classroom, with indexes showing slower rates of personal growth, and that student athletes remains less open to diversity and have low levels of self –understanding, along this line of research, the fact that athletes often "form a separate subculture" has been found to contribute to the downward spiral of achievement in many life skill areas among student- athletes (ibid). According to Aries E. and McCarthy D., not only does this subculture isolate student-athletes from non athletic peers, but it encourages negative, insulated behaviour such as binge drinking ,in a study of high – commitment athletes in a division III college level ,found that these student-athletes , as a result of their lifestyle on campus , " had lower verbal SAT scores, to a lesser degree lower math SAT scores ,and lower self-

assessments of their academic skills" these athletes also reported that their isolation contributed to poor academic performance, as they experienced problems such as Being taken seriously by professors, while these result would seem to negate the argument that participation in athletics helps improve academics do point out that this deficit vanishes when student- athlete academic performance is compared , not to the whole non athletic student body, but to students with comparable demographic profiles and SAT (Aries and McCarthy, 2004).

According to Ferris E. and Finster M.,(2004). explained that scores, upon entering college, when such pre-college difference were taken into consideration, researchers found "No differences between the academic achievement of intercollegiate athletes and non-athletes", other studies find that high commitment student athletes also spend enough time in other extracurricular activities to counteract the purported isolation of the sports subculture. Along the same lines of research, based on the study of overall school graduation rate statistic mandated by the federal government with regard to division I athletes does not take in to; account the demographics or the pre-existing academic standards of the particular schools. Nor had there been a careful consideration of the various ways in which student – athlete credentials are " compressed " to fit the needs of a school and how schools are willing to trade – off the athletic and academic dimensions of an admitted athlete in order to give him or her a well- rounded education. Moreover, variations in academic qualifications among some schools means that may student- athletes are denied entrance into schools where they would have been admitted had they applied only as a student (Ferris &Finster, 2004).

## 2.8. Characteristics of Quality Physical Education

### 2.8.1. Promotes Lifelong Wellness

Quality of life and sense of wellbeing are considered to be equally important to good health. This positive component of good health is now referred to as wellness. In recent years, evidence has accumulated demonstrating that physical activity can promote wellness in adults as well as youths. Self-assessed health-related quality of life is significantly better among people who

meet national activity guide lines than among those who do not. Active people are less likely to miss work and more likely to be productive at work and more likely to experience positive moods, are more likely to have better self-esteem, are more likely to experience more restful sleep and are more likely to function effectively in daily life than inactive people (Spirduso& Cornin, 2002).

Among children, positive relationship exists between self-esteem and physical activity and between self-concept and physical activity. Well-planned activities dedicated to the physical education standards such as helping youth's exhibit responsible personal and social behaviour that respects self and others in physical setting and valuing physical activity for health, enjoyment, challenge, self-expression and/or social interaction have the potential to lead youths to positive wellness outcomes. Criteria for quality physical education include the provision of instruction in a variety of motor skills that are designed to enhance the physical, mental and social/emotional development of every child, as well as the creation of an environment that supports the inclusion of all students (NASPE, 2004a).

### 2.8.2. Promote Lifelong Physical Fitness

Physical fitness, as it relates to good health, has been categorized into five components (cardiovascular fitness, strength, muscular endurance, flexibility, and body composition). Health-related fitness is the descriptor commonly used by health professionals (including physical educators). A strong body of evidence indicates that low cardiovascular fitness is related to higher risk of chronic disease and that high cardiovascular fitness has a protective effect for heart disease, high blood pressure, stroke, high blood lipid levels, diabetes and some forms of cancer. Strength and muscular endurance are associated with lower risk of osteoporosis and higher functional capacity (Corbin &Pangrazi, 2000).

Low fitness predisposes both youths and adults to health problems, and low fitness is associated with increased risk of obesity among youths. More important, those youths who are low in fitness when they are young are more

likely to be low in fitness as adults. Longitudinal studies on children provide strong evidence that low fit, inactive, and overweight children become low fit, inactive, overweight adults. Consequently, low fitness, inactivity, and obesity have become a major challenge for public health professionals and quality physical educators. Physical education is an excellent place to provide enjoyable, developmentally appropriate, health-enhancing doses of activity to children (Corbin, 2001).

### 2.8.3. Provides Unique Opportunities for Activity

Physical activity is a common denominator for health. The scientific evidence for providing youths with physical activity for healthy growth and development is unequivocal. Physical activity helps reduce the risk of disease, promotes wellness, contributes to energy balance and maintenance of healthy body composition, and promotes fitness development. Most adults fail to meet the standards for minimum physical activity. Many more teens are active than adults, but as teens move through school their activity levels decline. Providing physical education at all grade levels could reduce the decline in physical activity and may even prompt relatively inactive adolescents to maintain participation in physical activity as they transition into adulthood (NASPE, 2004b).

A variety of activities are encouraged, and periods of inactivity lasting two or more hours are discouraged. Without opportunities for physical activity in school, many children fail to meet minimal activity requirements. Physical education provides youths with meaningful amounts of daily physical activity and youths spend more time in moderate-to-vigorous physical activity when physical education is taught by effective physical education teachers. Further, research suggests that youths who are active in physical education are more likely to be active in non-school settings. The combined evidence points that expanded enrolment of students in physical education, taught by effective physical education teachers, increase the physical activity levels of youths (Dale, Corbin, & Dale, 2000).

### 2.8.4. Promote Learning

With recent efforts to improve scores on high stakes testing in areas such as reading, English, math, and science, competition for time during the school day has become intense. Quality physical education produces important physical education benefits while having no ill effect on academic learning. Research also indicates that increased time spent in physical education either enhances academic performance. In addition, research has demonstrated that even short bouts of physical activity, can affect cognitive functioning in children and in college students increased cognitive performance. Longer bouts of exercise during school day lead to significant improvements in math performance (Trudeau &Shephard, 2005).

Studies examining physical activity and cognitive performance have shown either a positive or neutral effect. Even neutral effects document that taking time for physical education does not diminish academic learning in other areas such as math, reading, and science. In a recent large-scale study on the relationship between physical fitness and academic achievement, it was found that higher achievement on standardized tests was associated with higher levels of physical fitness. Results indicated a consistent positive relationship between overall fitness and academic achievement. The relationship between fitness and achievement appeared to be stronger for females than males and stronger for higher socioeconomic status (SES) than lower socioeconomic status (SES) students (Grissom, 2005).

### 2.8.5. Helps to Educate the Total Child

Empty heads devoid of bodies do not come to school to be filled. Nor is school a place where we build bodies at the expense of the head. A central tenant of a sound educational philosophy is to educate the whole child. Most educators agree with the sentiment of the idea and support the notion that educating the total person is a worthy primary goal. The relationship between the soundness of the body and the activity of the mind is subtle and complex. The intelligence and skill can only function at the peak of their capacity when the body is healthy and strong, and that hardy spirits and tough minds usually inhabit sound bodies. Physical fitness is the basis of all activities.

Physical education is one of the subjects in school in which children have the opportunity to learn the motor skills and acquire the knowledge to participate in a variety of physical activities. It is the only academic subject in which physical activity is a primary means of accomplishing educational objectives. Additionally, quality physical education is unique in providing adolescents with self-management skills to become independently physically active as adults. Physical education is critical to the education of the total person and requires a quality program taught by physical education teachers (Flohr& Todd, 2003).

# CHAPTER THREE

# RESEARCH METHODOLOGY

This chapter deals with the general research methodology. It presents the research design, research method, description of the study area, the populations, sampling techniques, instrumentations, and methods of collection and analysis

## 3.1. Research Design

The study attempts to investigate the relationship between physical fitness and academic performance. For this purpose, the design of the study is descriptive survey design to correlate students' physical fitness and academic performance. The study design utilized a quantitative approach so as to identify the existing relationship between students' physical fitness levels to student academic achievement, as well as pairing them together to compare fitness level scores and performance scores.

## 3.2 .Research Method

Since the study design is descriptive survey study of the existing relation between student's academic achievement and physical fitness performance so, it was conducted by using quantitative research method. This method is selected because; it helps to the accurate and complete description of the comparison study methods. It helps to make detailed to analysis of existing phenomena with the intent of employing data to justify current condition. The other method was practical observation in the field to test student fitness like endurance test, strength test; flexibility test, cardiovascular test, and body mass index test were provided by using physical fitness performance test.

## 3.3 Description of the study area

The research conducts at Guji Zone Secondary schools. Guji Zone is one of the 24 Zones of Oromia Regional State which is found in the south east part of Ethiopia. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), this Zone has a total population of 1,389,800, of whom 702,580 are men and 687,220 women; with an area of 18,577.05 square kilometers, Guji has a population density of 74.81. While 129,852 or 14.31%

are urban inhabitants, a further 5,315 or 0.38% are pastoralists. A total of 269,440 households were counted in this Zone, which results in an average of 5.16 persons to a household, and 258,540 housing units. The four largest ethnic groups reported in Guji were the Oromo (78.57%), the Gedeo (14.33%), the Amhara (2.59%) and the Somali (1.59%); all other ethnic groups made up 2.92% of the population. Oromiffa was spoken as a first language by 77.91%, 14.16% spoke Gedeogna, 4.31% spoke Amharic and 1.61% spoke Somali; the remaining 2.01% spoke all other primary languages reported. The majority of the inhabitants professed Protestantism, with 56.14% of the population having reported they practiced that belief, while 14.8% of the population were Muslim, 11.32% of the population said they held traditional beliefs, 7.49% professed Ethiopian Orthodox Christianity and 2.12% were Catholic. Guji is bordered on the south by Borena, on the west by the Southern Nations, Nationalities, and Peoples Region, on the north by the GanaleDorya River which separates it from Bale and on the east by the Somali Region. The Guji Zone was created in September 2002, when the upland Woredas of the Borena Zone were split apart to create it the highest point in this zone is Mount DaraTiniro. Cities and major towns in this Zone include its administrative centre, Negele. (Source: Geographical information system, From Wikipedia, the free encyclopaedia)

## 3.4 Population and sampling techniques

The target populations of the study were Woredas in Guji Zone, secondary schools and the students. The Guji Zone consists of 15 Woredas and 40 secondary schools. The study targeted these populations for they are directly related to the objective of the study.

Out of the 15 Woredas, a sample of one third or 5 Woredas are selected by using cluster sampling technique. The sample Woredas are named as: Adola woyu, Adola Rede, Odo shakiso, Shakiso town administrater and Ana Sora woreda. In the sample woredas, by using cluster sampling technique, Thus, from a total of 8 secondary schools in sample woredas, 5 sample secondary schools i.e. one secondary school from each sample woreda are randomly selected. The sampled secondary schools are named as Adola woyu secondary school, Boke Bulala secondary school, Megado secondary school, shakiso

secondary school and Yirbamuda secondary school. In the sample schools, there are a total of 3800 students, of which, 2000 are males and 1800 are female students. For the purpose of testing the relationship between physical fitness and student's academic performance, the researcher used Cochran's sample size formula for categorical data to determine the appropriate sample size. Cochran had set the alpha level a priori at .05, and used a proportional variable, had set the level of acceptable error at 5%.

$$n_0 = \frac{(t)^2 * (p)(q)}{d^2} = \frac{(1.96)^2 * (0.5)(0.5)}{(0.05)^2} = 384$$

Where t = value for selected alpha level of .025 in each tail = 1.96 (standard deviation of the scale as .5). The alpha level of .05 indicates the level of risk the researcher was willing to take that true margin of error may exceed the acceptable margin of error).

Where (p)(q) = estimate of variance = .25. P = maximum possible proportion (0.5), (maximum possible proportion (.5) * 1- maximum possible proportion (.5) produces maximum possible sample size). Where d = acceptable margin of error for proportion being estimated = .05 (error researcher is willing to accept).

Therefore, for a population of 3800, the required sample size is 384. However, since this sample size exceeds 5% of the population (3800*.05=190), Cochran's (1977), correction formula should be used to calculate the final sample size. These calculations were as follows:

$$n_1 = \frac{n_0}{1 + \frac{n_0}{N}} = \frac{384}{1 + \frac{384}{3800}} = 348$$

Where population size (N) = 3800, Where n0 = required return sample size according to Cochran's formula= 384

Where n1 = required return sample size because sample > 5% of population. These procedures result in a minimum returned sample size of 348. Thus, According to the ratio of the total students 53 % are male and 47% are female. So a total of 348 high school students (183 sample male and 165 sample female students) are selected by using cluster sampling technique.

In other words, the determine proportion n/N the sample size required is 348. Therefore, n=348, is multiplied by the number of Sample size in each stratum by the obtained proportion, that is, 0.0915 in order to determine the sample size in each secondary schools. Based on this, the following sample size was made:

**Table 1: sample size for students**

| Name of School | Grade | Sex | No. of student | Proportionality | Sample size |
|---|---|---|---|---|---|
| Adola woyu secondary school | 9 | M | 200 | 200×0.0915 | 18 |
| | | F | 190 | 190×0.0915 | 18 |
| | 10 | M | 150 | 150×0.0915 | 14 |
| | | F | 100 | 100×0.0915 | 9 |
| | **Total** | | **640** | | **59** |
| Boke Bulala secondary school | 9 | M | 220 | 220×0.0915 | 20 |
| | | F | 120 | 120×0.0915 | 11 |
| | 10 | M | 158 | 158×0.0915 | 15 |
| | | F | 87 | 87×0.0915 | 8 |
| | **Total** | | **585** | | **54** |
| Megado secondary school | 9 | M | 190 | 190×0.0915 | 17 |
| | | F | 200 | 200×0.0915 | 18 |
| | 10 | M | 170 | 170×0.0915 | 16 |
| | | F | 186 | 186×0.0915 | 17 |
| | **Total** | | **746** | | **68** |
| shakiso seconda school | 9 | M | 320 | 320×0.0915 | 29 |
| | | F | 280 | 280×0.0915 | 26 |
| | 10 | M | 175 | 175×0.0915 | 16 |
| | | F | 275 | 275×0.0915 | 25 |
| | **Total** | | **1050** | | **96** |
| Yirbamuda secondary school | 9 | M | 310 | 310×0.0915 | 28 |
| | | F | 260 | 260×0.0915 | 24 |
| | 10 | M | 107 | 107×0.0915 | 10 |
| | | F | 102 | 102×0.0915 | 9 |
| | **Total** | | **779** | | **71** |
| **Total** | **M** | | **2000** | **2000*0.0915** | **183** |
| | **F** | | **1800** | **1800*0.0915** | **165** |
| | **Total** | | **3800** | **3800*0.0915** | **348** |

## 3.5. Data Collection Instrument

To get the reliable information from the study participants, the types of instruments to be used have paramount significance. Thus, the researcher use physical fitness test scores to determine the physical fitness level of the students. The physical fitness test is the method that is used to determine the fitness level of the students who are participating in physical education class. The physical fitness test is criterion-referenced standards which are based on research and are used to assess the fitness performance of the students. These criterion-referenced standards are matched to a level of fitness that guard against circumstances that could result from an inactive lifestyle. The other method is student's academic result during first semester and the second semester mid exam results in maths, English, Geography, Chemistry, History, and Biology.

## 3.6. Pilot Test

Before administering a pilot test, in order to reduce the flaws that might happen in the selection of this instrument, I have shown the selected fitness testes to my advisors, colleagues, experts working in the field of physical education and the high school teachers to reviewed and commented on the appropriateness of tests. As a result, the researcher got basic ideas to eliminate those of high intensity fitness test activities. Rather the fitness test activities should be changed to light intensity activities.

Finally, the letter was written from Addis Ababa University to the place where the pilot study was conducted. Then it was given to the school principal, and the school principal gave me a permission to administer pilot test on one school of the Guji Zone high schools. This pilot-test was conducted on Boke Bulala Secondary School students not supposed to be included in the actual study. The researcher selected one section randomly and conducted the pilot test. The pilot test for five selected fitness tests was conducted on 40 students (20 male and 20 female).

### 3.6.1. Validity of Instrument

The fitness tests selected by the researcher should address the research questions under investigation. The face, construct and Content validity of each item in the test were approved by a group of experts of physical education, physical education teachers, advisors, and experts of fitness. Best and Kahn (2002) describes that the items of the instrument should represent a significant aspect of the purpose of the investigation. Content validation was established by cross-referencing the content of fitness components to those elements contained in the basic research questions to determine if there was indeed a match. That is, the fitness tests were in line with the answer to the research questions. Content validity addresses to what extent the appropriate content is represented in questions. The classroom teachers were also analyzes the relation of the test items to the instructional objectives.

### 3.6.2. Reliability of Instrument

The fitness tests were pre- tested at Boke Bulala Secondary School students that have the same characteristics as those in the main study. The participants in the pilot study were 40 students who is volunteered to participate. However, all are excluded from the main study. The purpose of this test is to check the appropriateness of the fitness tests and to make the necessary corrections based on the feedback obtained. After scoring the fitness tests, the results were coded and entered to SPSS soft ware version 20.0. Then internal consistency (reliability) of the test computed in order to evaluate the scales and their reliability.

**Table 2: Reliable test results**

| **No** | **Tests** | **Cronbach Alpha value** | **N** |
|---|---|---|---|
| 1 | Sit and reach test | 0.71 | 40 |
| 2 | Curl up test | 0.73 | 40 |
| 3 | Push up test | 0.68 | 40 |
| 4 | One mile run test | 0.78 | 40 |
| 5 | Body mass index test | 0.81 | 40 |
| | **Total** | **0.76** | 40 |

The reliability of the five fitness tests was checked using coefficient of Cronbach Alpha. Thus, the coefficient of Cronbach Alpha of the sit and reach test was 0.71, the curl up test was 0.73, the push up test was 0.68, the one mile run test was 0.78 and the Body mass index was 0.81. The overall Cronbach Alpha value was 0.76.

Thus, the fitness test instruments were found reliable to collect data for the main study and then conducted as scheduled.

## 3.7. Methods and Procedures of Data Collection

### 3.7.1. Physical Fitness Measurements

The physical fitness of students, and their body composition was measured by using body mass index (BMI). Flexibility was determined by sit and reach test, muscular strength and endurance was determined by curl-up, trunk lift and push up test, cardiovascular endurance was determined by one mile run. Then the total of various sub items was calculated and which converted to a scale standard scores and percentile.

### 3.7.2. Physical Fitness Testing Procedures

***A. Curl-up Test***

The students begin by lying on their back, knees bent at approximately 140 degrees, feet flat on the floor, legs slightly apart, arm straight and parallel to the trunk with palms of hands resting on the mat. The fingers are stretched out and the head is in contact with the mat. The measuring step is placed on the mat under the students legs so that their fingertips are just resting on the nearest edge of the measuring strip. The feet cannot be held or rest against an object. By keeping their heels in contact with the mat, students rest their fingers across the measuring strip until the fingertips reach the other side and curls back down until their head touches the mat. Movement should be smooth and at the cadence of 20 curl-ups per minute (one curl up every 3 seconds).

***B. Push-up Test***

The push-up fitness test (also called the press up test) is used for measuring the upper body strength and endurance. Push-up begins with the hands and toes touching the floor, the body and the legs in a straight line, feet slightly apart, the arms at shoulder width apart, extended and at a right angle to the body. Keeping the back and knees straight, the subject lower the body to a predetermined point to touch some other object or until there is a 90-degree angle at the elbows, and returns back to the straight position with the arms extended. The action is repeated, and test continues until exhaustion, or until

they can do no more in rhythm or have reached the target number of push-ups.

***C. Sit and Reach Test***

This test involves sitting on the floor with legs stretched out straight ahead. Shoes should be removed. The soles of the feet are placed flat against the box. Both knees should be locked and pressed flat to the floor the tester may assists by holding them down with the palms facing down wards, and the hands on top of each other or side by side. The subject reaches forward along the measuring lines as far as possible. Ensure that the hands remain at the same level, one hand not reaching further forward than the other hand. After some practice is reaches, the subject reaches out and holds that position for one to two seconds while the distance is recorded.

***D. One mile run Test***

This is measured by the 1 mile endurance run. The aim of this test is to complete a one mile run course in the shortest possible time. At the start, all the participants are lined up behind the starting line on the command go the clock starts, and the students begin running at their own pace. The total time to complete the race is recorded for each participant, in the minute and seconds.

**E. *Body Mass Index (BMI)test***

BMI stands for body mass index. It is a measured body composition. BMI is calculated by taking students' weight and dividing it by the height squared.

### 3.7.3. Academic Performance Measurements

The students' academic achievement was measured during first semester exams prepared by the school department. Six subjects Mathematics, English, Biology, Chemistry, Geography and History were selected to measure students' academic achievement. The average of the six subjects were taken to analysis

the relationship between selected fitness components and academic achievement.

## 3.8. Data Analysis

Data for this study were analyzed by using SPSS version 20.0. Data obtained from physical fitness tests were broken down and compared between groups. A descriptive statics, mean, standard deviation, maximum and minimum were used. To know the relation between physical fitness and academic performance Pearson correlation was used. An independent t-test was computed to compare the mean of academic achievement between physically fit and unfit groups.

## 3.9. Ethical issue

Research ethics refers to the type of agreement that the researcher enters into with his or her research participants. Ethical considerations play a role in all research studies and all researchers must be aware of and attend to the ethical considerations related to their studies. Therefore the researcher communicates secondary schools legally and smoothly. The purpose of the study was made clear and understandable for all participants. Any communication with the concerned bodies was accomplished at their voluntarily agreement without harming and threatening the personal and institutional wellbeing. Participant's economic background, ethnicity or race as means of identify was not considered because all these have nothing to do with the idea of the research disregards these issues. But during testing physical fitness the student's health status and physical disability care was taken. The identity of the respondents was kept confidential.

# CHAPTER FOUR

# DATA ANALYSIS AND INTERPRETATION

This part of the study deals with the analysis of the data gathered through the fitness tests and students academic result. Furthermore, the main findings of the study are presented with the help of tables followed by descriptive statics; correlation and independent t-test were done. The total populations of this study were 348. Of these; 183 were male and 165 were females.

## 4.1. Demographic Characteristics of Students

Three demographic variables of the respondents were gathered as background information. These are: age, sex and education summarized in the following table below. Descriptive statics cross tabulation of each variables in each high schools were manipulated as follows.

**Table 3: Personal Profile of Students by Sex, Age, and Grade Level**

| N | Items | | Schools | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **Adolawo** | | **Boke Bulal** | | **Megado** | | **Shakiso** | | **yirbamu** | | **Total** | |
| | **Sex** | | | | | | | | | | | | | |
| | | | ***f*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** | ***F*** | ***%*** | ***f*** | ***%*** | ***f*** | ***%*** |
| | | Male | 32 | 54.2 | 35 | 64.8 | 33 | 48.5 | 45 | 46.9 | 38 | 53.5 | **183** | **52.6** |
| | | Fema e | 27 | 45.8 | 19 | 35.2 | 35 | 51.5 | 51 | 53.1 | 33 | 46.5 | **165** | **47.4** |
| | | **Tota** | **59** | **100** | **54** | **100** | **68** | **100** | **96** | **100** | **71** | **100** | **348** | **100** |
| | **Age** | 13-1 | 29 | 49.2 | 20 | 37.0 | 28 | 41.2 | 50 | 52.1 | 19 | 26.8 | **146** | **42.0** |
| | | 16-1 | 30 | 50.2 | 34 | 62.9 | 40 | 58.8 | 46 | 47.9 | 52 | 73.2 | **202** | **58.0** |
| | | **Tota** | **59** | **100** | **54** | **100** | **68** | **100** | **96** | **100** | **71** | **100** | **348** | **100** |
| | **Grade Level** | 9th | 36 | 61.0 | 31 | 57.4 | 35 | 51.5 | 55 | 57.3 | 52 | 73.2 | **209** | **60.0** |
| | | 10th | 23 | 39.0 | 23 | 42.5 | 33 | 48.5 | 41 | 42.7 | 19 | 26.8 | **139** | **40.0** |
| | | **Tota** | **59** | **100** | **54** | **100** | **68** | **100** | **96** | **100** | **71** | **100** | **348** | **100** |

Concerning the sex of the respondents, 183(52.6%) of the respondents were males, while 165(47.4%) of the respondents were females. Concerning the age of the respondents, 146(42.0%) of the respondents' age ranges between 13 and 15 years, and 202(58.0%) of the respondents' age ranges between 16 and 18 years. Regarding the educational level of the respondents, 209(60.0%) of the respondents are Grade 9 students, while 139(40.0%) of the respondents are Grade 10 students. According to cooper institute, 2007, health related fitness standards, the pick level of fitness gains at the age of 13-18 years. So the majorities of these study variables are fell in the age groups of 16-18 years which helps to get the accepted health fitness standard level.

## 4.2 Interpretation of Fitness Test Results

### 4.2.1 Fitness Result of Male Students

The five fitness tests scores were analyzed by using descriptive statistics, mean and standard deviation. This analysis method describes the mean value of each fitness tests among fit and unfit male's students. The fitness levels of students were interpreted as fit or unfit was based on the standards set by the (cooper Institute, 2007). See appendix III. The results for each variable are discussed in table below. It also presents a summary of finding and discussion of the results.

**Table 4: Fitness result of male students**

| Item | Variables | Category | N | Mean | S.D |
|---|---|---|---|---|---|
| 1 | sit and reach test | Fit | 87 | 11.13 | 2.294 |
| | | Unfit | 96 | 6.26 | 2.422 |
| 2 | Curl up test | Fit | 87 | 27.76 | 7.855 |
| | | Unfit | 96 | 14.35 | 3.971 |
| 3 | Push up test | Fit | 87 | 18.68 | 8.327 |
| | | Unfit | 96 | 10.26 | 2.516 |
| 4 | One mile run | Fit | 87 | 7.7203 | .50328 |
| | | Unfit | 96 | 9.955 | 1.152 |
| 5 | Body Mass Index | Fit | 87 | 21.0368 | 1.6407 |
| | | Unfit | 96 | 17.026 | 1.889 |

As we can see from the above table (table 4), the five fitness test records of 183 male students listed on appendix C. All of the participants were in the age group of 13-18 years old. According to the standards for health related fitness zone 87 of the scores fell in the Healthy Fitness Zone (meets health- related standard). Meaning their fitness level in each fitness variables is in the good fitness zone. The researcher takes these 87 students as physically fit group. While the remaining 96 of the scores fell in the needs Improvement Zone (does not meet health- related standard) in each fitness components, meaning their

fitness level is in the poor fitness zone. The researcher takes these 96 students as physically unfit group. All the interpretations were based on the standards. (See the row data on Appendix C).

### 4.2.2 Fitness Result of Female Students

The five fitness tests scores were analyzed by using descriptive statistics, mean and standard deviation. This analysis method describes the mean value of each fitness tests among fit and unfit female's students. The fitness levels of students were interpreted as fit or unfit was based on the standards set by the cooper institute, 2007. See appendix. The results for each variable are discussed in table below. It also presents a summary of finding and discussion of the results.

**Table 5: Fitness result of female students**

| Item | Variables | Category | N | Mean | S.D |
|---|---|---|---|---|---|
| 1 | sit and reach test | Fit | 59 | 10.81 | 2.798 |
| | | Unfit | 106 | 6.04 | 2.103 |
| 2 | Curl up test | Fit | 59 | 25.43 | 6.609 |
| | | Unfit | 106 | 10.63 | 3.078 |
| 3 | Push up test | Fit | 59 | 17.53 | 9.186 |
| | | Unfit | 106 | 6.33 | 3.464 |
| 4 | One mile run | Fit | 59 | 8.3950 | .85955 |
| | | Unfit | 106 | 11.394 | 1.645 |
| 5 | Body Mass Index | Fit | 59 | 22.0763 | 1.7562 |
| | | Unfit | 106 | 16.507 | 2.031 |

As we can see from the above table (table 5), the five fitness test records of 165 female students listed on appendix D was interpreted based on the standards. All of the participants were in the age group of 13-18 years old. According to the standards for health related fitness zone 59 of the scores in each fitness tests, fell in the Healthy Fitness Zone (meets health- related standard). Meaning their fitness level is in the good fitness zone. The researcher takes these 59 students as physically fit group. While the remaining 106 of the students fitness scores fell in the needs Improvement Zone (does not meet health- related standard) in each fitness components, meaning their fitness level is in the poor fitness zone. The researcher takes these 106 students as physically unfit group. All the interpretations were based on the standards. (See the row data on Appendix D).

The fitness result of female students with respect to one mile run test is 11.39sec which is higher than that of male students (mean 8.3 sec). This shows that males are fit in cardiovascular endurance than females.

## 4.3 Descriptive statistics of Academic achievement and Physical fitness test

The data were analyzed using the mean, standard deviation, with the maximum and minimum value of scores. This analysis method describes the mean value of each fitness tests and average academic achievement among males, females and total fit students. The results for each variable are discussed in table below. It also presents a summary of finding and discussion of the results.

**Table 6: descriptive statistics of physically fit study variables among males and females**

| Variable | Male ( N= 87) | | | | Female (N=59) | | | |
|---|---|---|---|---|---|---|---|---|
| | Min | Max | $\bar{X}$ | S.D | Min | Max | $\bar{X}$ | S.D |
| Average Academic Achievement | 40. | 91. | 65.59 | 8.940 | 44. | 79. | 67.11 | 6.065 |
| sit and reach test | 9. | 15. | 11. | 1.855 | 9. | 20. | 13.22 | 2.076 |
| Curl up test | 15. | 44. | 30.59 | 7.599 | 6. | 40. | 22.44 | 6.742 |
| Push up test | 7. | 34. | 21.48 | 7.571 | 3. | 34. | 10.06 | 4.046 |
| 1-mile run | 7. | 8. | 7.69 | .499 | 7. | 12. | 8.97 | 1.128 |
| BMI test | 18. | 23. | 21.03 | 1.485 | 18. | 24.8 | 22.07 | 1.602 |

| Variable | Total Fit participants (N= 146) | | | |
|---|---|---|---|---|
| | Min | Max | $\bar{X}$ | S.D |
| Average Academic Achievement | 40. | 91. | 65.78 | 7.813 |
| sit and reach test | 9. | 20. | 11.40 | 2.106 |
| Curl up test | 8. | 44. | 27.02 | 8.963 |
| Push up test | 7. | 34. | 17.6 | 8.69 |
| 1-mile run | 7. | 10. | 7.97 | .776 |
| BMI test | 18 | 24. | 21.9 | 1.559 |

Min- minimum, Max- maximum, $\bar{X}$= mean, S.D= Standard division

As data in table 6 indicates that female students achieved better academic marks (mean= 67) than Male students (mean = 65.5), although the difference was not necessarily statistically significant. The mean sit and reach test of male students (11.13) appeared to be lower than that of female students (13.22). Similarly, the mean curl up test of male students (30.59) is significantly higher than that of female students (22.44). When we see the mean of push up test, male students scored (21.48) higher than that of female students score (10.06). Whereas, the mean one mile run test of female students (8.97) appeared to be higher than that of male students (7.69). Similarly, the mean result of body mass index test better in males (21.03) than females (22.07) student.

Here, we can infer that female students scored better average academic achievement relatively to males. And also females scored higher than males in the flexibility and cardiovascular fitness results. Whereas males scored higher than females in lower body and upper body strength measurements, and also males are superior in body composition result.

The total academic achievement of physical fit students falls in the minimum (40.33) and the maximum (91.83) with the mean of 65.78. The fitness test scores for the total group shows that 11.40, 27.02, 17.62, 7.97 and 21.99 the means of sit and reach, curl up, push up, one mile run test and body mass index respectively.

## 4.4 Correlation coefficients of academic measurements with physical fitness parameters in the overall fit samples and among genders

The following data were analyzed using the bi-variate correlation between average academic achievement and fitness testes. This analysis method correlates the relation between each fitness tests and average academic achievement among males, females and total fit students. The results for each variable are discussed in table below. It also presents a summary of finding and discussion of the results.

**Table 7: correlation coefficients of academic measurements with physical fitness parameters in the overall fit samples and among genders**

| **Fitness testes** | **Average academic achievements** | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| | **Male ( N= 87)** | | **Female (N= 59)** | | **Total group (N=146)** | |
| | | | | | | |
| | Pearson Correlation | P-valu | Pearson Correlation | P-value | Pearson Correlation | P-value |
| **sit and reach test** | **-.283*** | .013 | .128 | .279 | -.068 | .408 |
| **Curl up test** | **.265*** | .021 | **.469*** | .000 | **.331*** | .000 |
| **Push up test** | .119 | .306 | **.250*** | .032 | **.177*** | .030 |
| **1-mile run test** | -.066 | .569 | -.014 | .905 | .017 | .834 |
| **BMI test** | .197 | .087 | **.288*** | .013 | **.215*** | .008 |

*. Correlation is significant at the 0.05 level (2-tailed).

Table 7 displays the correlation coefficient of academic measurements with physical fitness parameters in the overall sample and in the male and female groups. The analysis showed that the results of the sit and reach test, exhibited significant negative correlations (r = -0.283) at p-value 0.013 which is less than 0.05 with academic achievement in male participants although these correlations were of small practical significance.

The result of curl up test showed significant positive correlation (r= 0.265, 0.469 and 0.331) at (p< 0.05) with academic achievement in male, female and

total group participants respectively. These correlations were of small practical significance in male and total group participants. Whereas, these correlation shows medium practical significance in female participants with average academic achievement.

The results of the push-up test, exhibited significant positive correlations (r = 0.25) and (r=0.177) at p-value 0.030 and 0.032 which are less than 0.05 with academic achievement in female and total group participants respectively. Although these correlations were of small practical significance with Academic achievement. The result of one mile run test has no significant value since the p-value was greater than 0.05.

The results of body mass index test, exhibited significant positive correlations (r = 0.288) and (r = 0.215) at p-value 0.013 and 0.008 which is less than 0.05 with academic achievement in female and total group participants respectively. Although these correlations were of small practical significance to academic achievement.

Here, we can conclude that, with the exception of the sit and reach test, one mile run test, other results showed significantly positive correlations with academic performance, specifically curl up test showed significantly positive correlations with academic achievement among the male, female and total group participants. Of these, positive correlations with a medium effect were found between curl up test and academic achievement among female participant. Push up and body mass index tests showed significantly positive correlations with academic achievement among the female and total group participants although this correlations showed small practical significance to academic achievement.

## 4.5 Descriptive Statistics of Physically Unfit Study Variables

The data were analyzed using the mean, standard deviation, with the maximum and minimum value of score. This analysis method describes the mean value of each fitness tests and average academic achievement among males, females and total unfit students. The results for each variable are discussed in table below. It also presents a summary of finding and discussion of the results.

**Table 8: descriptive statistics of physically unfit study variables**

| Variable | Male ( N= 96) | | | | Female (N= 106) | | | |
|---|---|---|---|---|---|---|---|---|
| | Min | Max | $\bar{X}$ | S.D | Min | Max | $\bar{X}$ | S.D |
| Average | 41.0 | 85.5 | 57.7451 | 10.83010 | 42.50 | 84.0 | 61.4819 | 12.42017 |
| sit and reach | 2.00 | 8.00 | 5.9896 | 1.88900 | 2.00 | 8.00 | 6.6132 | 1.57704 |
| Curl up | 8.00 | 40.0 | 20.145 | 8.53966 | 5.00 | 32.0 | 15.7830 | 7.34848 |
| Push up | 6.00 | 35.0 | 14.250 | 6.96457 | 2.00 | 31.0 | 12.0189 | 8.59233 |
| 1-mile run | 7.00 | 12.1 | 9.4736 | 1.48171 | 7.15 | 14.2 | 9.9772 | 2.05216 |
| BMI test | 12.8 | 22.6 | 17.501 | 1.96750 | 9.10 | 22.6 | 16.0075 | 1.77762 |

| Variable | Total Unfit participants (N= 202) | | | |
|---|---|---|---|---|
| | Min | Max | $\bar{X}$ | S.D |
| Average Academic | 41.00 | 87.50 | 59.6413 | 11.73574 |
| sit and reach test | 2.00 | 9.00 | 6.0050 | 1.82437 |
| Curl up test | 5.00 | 44.00 | 17.4802 | 8.07071 |
| Push up test | 2.00 | 35.00 | 12.6287 | 6.99934 |
| 1-mile run | 7.00 | 14.20 | 9.8293 | 1.69043 |
| BMI test | 9.10 | 22.60 | 16.9990 | 2.08735 |

Min- minimum, Max- maximum, $\bar{X}$= mean, S.D= Standard deviation

From the above table (table 8) we can understand that the average academic result would appear that female students achieved better academic marks (mean= 61.48) than Male students (mean = 57.74), although the difference was not necessarily statistically significant. This result showed that students with poor physical fitness level achieve near to the standard pass mark (50%). The

mean sit and reach test of female students (6.61) appeared to be higher than that of male students (5.98), still there is no significance difference. Similarly, the mean curl up test of male students (20.14) is significantly higher than that of female students (15.78). When we see the mean of push up test, male students scored (14.25) higher than that of female students score (12.00). Whereas, the mean one mile run test of female students (9.99) appeared to be higher than that of male students (9.4). Similarly, the mean result of body mass index test better in females (16.00) than male (17.5) student.

Here, we can infer that male scored higher than females in the upper and lower body strength and endurance measurements, while females were superior in the Academic achievement, flexibility, the cardiovascular fitness and body composition. The total academic achievements of physical unfit students fall in the minimum (41.0) and the maximum (87.5) with the mean of 59.64.

The fitness test scores for the total group shows that 6.00, 17.48, 12.62, 9.82 and 16.99 the means of sit and reach, curl up, push up, one mile run test and body mass index respectively.

## 4.6 Correlation Coefficients of Academic Measurements with Physical Fitness Parameters in the overall Sample and Among Genders

The following data were analyzed using the Pearson correlation between average academic achievement and fitness testes. This analysis method correlates the relation between each fitness tests and average academic achievement among males, females and total unfit students. The results for each variable are discussed in table below. It also presents a summary of finding and discussion of the results.

**Table 9: correlation coefficients of academic measurements with physical fitness parameters in the overall sample and among genders**

| **Fitness testes** | **Average academic achievements** | | | | | |
|---|---|---|---|---|---|---|
| | **Male ( N= 96)** | | **Female (N= 106)** | | **Total group (N=202)** | |
| | Pearson Correlation | P-valu | Pearson Correlation | P-value | Pearson Correlation | P-value |
| **sit and rich test** | -.107 | .568 | .041 | .839 | -.063 | .639 |
| **Curl up test** | -.202 | .277 | -.344 | .079 | **-.350*** | .007 |
| **Push up test** | -.082 | .661 | **-.495*** | .009 | **-.328*** | .012 |
| **One mile run tes** | .219 | .236 | .339 | .084 | **.340*** | .009 |
| **BMI test** | .043 | .820 | -.088 | .662 | -.044 | .745 |

***. Correlation is significant at the 0.05 level (2-tailed).***

Table 9 displays the correlation coefficient of academic measurements with physical fitness parameters in the overall unfit samples and in the male and female groups. The analysis showed that the results of the sit and reach test has no significant correlation value in all groups. But the result of curl up test exhibited significant negative correlations (r = -0.350) at p-value 0.07 which is less than 0.05 with academic achievement in total group participants although these correlations were of small practical significance.

And also the result of push up test showed significant negative correlation (r= -0.495 and r = -0.328) at p-value 0.09 and 0.013 with academic achievement in

female and total group participants respectively. These correlations were of medium practical significance in females. Whereas, these correlation shows medium practical significance in total groups participants with average academic achievement.

The results of one mile run test, exhibited significant positive correlations (r = 0.340) at p-value 0.09 which is less than 0.05 with academic achievement in total group participants although these correlations were of small practical significance to academic achievement.

The result of body mass index showed that no significant correlation between fitness test and academic achievement.

Here, we can conclude that, As the fitness test result is low, the student's academic achievement With the exception of the sit and reach test and body mass index test, other results showed significantly negative correlations with academic performance, specifically push up test showed significantly negative correlations with academic achievement among the female and total group participants. Of these, negative correlations with a medium effect were found between push up test and academic achievement among female participant. One mile run test showed significantly positive correlations with academic achievement among the total group participants although these correlations were of small practical significance to academic achievement.

## 4.7. Independent t-test to compare the mean of academic achievements between Fit and Unfit groups

The data were analyzed using the mean, standard deviation, independent sample t-test. Independent t-test was used to test for significance differences between groups. It was chosen because there were two groups (fit and unfit) for comparison. The results for each variable are discussed in each table below. It also presents a summary of finding and discussion of the results.

**Table 10: Independent t-test to compare the mean of academic achievements between the two groups**

| Group Statistics | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Fitness level** | **N** | **Mean** | **SD** | **M** | | |
| **Average Academic achievement** | Fit | 146 | 65.7 | 7.813 | 6.137 | 22.7 | .0 |
| | Unfit | 2 | 59.6 | 11.735 | | | |

N= Total sample size, SD= Standard deviation, MD= Mean difference, t= table value and p= probability value

From the above table (table 10) we have seen that, the mean for each of the two groups in the "Group Statistics" section. This output shows that the average academic achievement in physically fit groups is 65.786, versus 59.649 in unfit groups.

The mean difference between the two group is 6.137 at p-value 0.000. This implies that the difference in means is statistically significant at the p-value = 0.05 levels.

Here, we can conclude that physical fitness and academic achievement have a direct relationship. As fitness level increases, academic achievement also increases.

## 4.8 Discussion

The total sample size of this study is 348 students selected randomly from the five selected high schools in Guji zone. From those 183 are males and 165 are females. Based on their fitness test result students are grouped in to physically fit and unfit groups. Quantitatively, 87 males and 59 females' total 146 students are physically fit while 96 males and 106 females' total 202 students are unfit. The fitness interpretations are based on the standards of fitness tests.

As cited from (**http://www.ibe.unesco.org/** website, Mean BMI and percentage body fat of the total group of participants can be classified as "normal", according to the cut-off points for growing children of Cole *et al.* (2000). In the total group of subjects, the mean PACER-test results (Meredith &Welk, 2009), as well as the mean total strength scores (57th percentile) indicated that the aerobic and muscle fitness of the total group could be considered average to slightly above average.

Although the statistical significance of differences between genders with regard to physical fitness components was not included in the aim of this study, it is worth noting that the differences between boys and girls with regard to percentage body fat (girls usually show higher percentage body fat), aerobic capacity (boys show greater aerobic capacity), flexibility (girls are usually more flexible) and strength (boys are usually stronger) appeared to be similar to those recorded in literature for these age groups (Pesce et al., 2013).

However, in this study, the mean of sit and reach test, curl up test, push up and body mass index in males are slightly greater than that of in females. Whereas, the mean of one mile run test in females is slightly greater than that of in males. This indicates that males are more flexible, stronger and have low body fat than females while females have good cardiovascular fitness than males. When we see the academic achievement of those physically fit students, males score the maximum result than females but the average academic result is better in females than males. Here we can understand that cardiovascular fitness has a positive correlation effect than other health related fitness.

Significant negative correlations were found between sit and reach tests and academic performance, among the total groups of physically fit participants. Significantly positive correlations were found between curl up test and academic achievement in the total groups, including male and female participants. Furthermore, the push up and body mass index test results, significantly correlate with academic achievements in both male and female participants.

The significant correlation between percentage body fat and academic performance in the over-all female group, agrees with results found in the study of Datar and Strum (2006), where overweight status had an adverse effect on academic outcomes among girls, but not among boys. Furthermore, significant differences between boys and girls with regard to correlations between aerobic fitness and academic performance were found in the studies of Corbin &Pangrazi (2000). In contrast to the specific strength tests of wall sitting and sit-ups, as well as the sit-and-reach flexibility test (left), Steyn (2006) proposed that some discriminating factors might be interrelated, and should be considered together as fitness variables and not as separate factors.

While the research literature cannot yet fully explain why fit learners may perform better in academic parameters, Chomitzet, (2009) proposed that, in addition to the proven effects of aerobic exercise and fitness on brain function and cognition, the relationship between fitness and academic achievement may reflect the overall achievement orientation of motivated learners. These authors also suggest that a learner's physical fitness may reflect better overall health, which has been shown to contribute to academic performance. Cottrell et al. (2007) agrees that the role players in academic performance are complicated and that children's academic test scores are influenced by a combination of factors including fitness index, gender, cardiovascular risk factors and socio-economic status.

In general, the study found that there was a significant relationship (correlation) between physical fitness and academic performance in the total group. Also, the mean of academic achievement of physically fit participants is greater than that of the unfit ones.

# CHAPTER FIVE
# SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter deals with summery, conclusion and recommendations. In this section first summary of the study and major findings are made. Second, conclusions of the fundamental findings are drawn. Finally, some possible recommendations forwarded based on the findings of the study.

## 5.1. Summary

The main purpose of this study is to investigate the relationship between practical teaching of physical education and academic performance of secondary school students in Guji Zone of Oromia Regional state. In order to achieve the purpose of the study the following basic research questions were raised.

1. What does the relationship between physical fitness and students' academic performance look like?
2. Is there a significant difference between selected fitness components tests with academic results among students?
3. What does the result in academic and physical fitness tests of participants (female and male students) look like?
4. Do physically fit students or physically unfit students score high academic results?

To answer these questions, the researcher employed a descriptive survey design with co-relational design to investigate the existing relationship between physical fitness and academic performance of secondary school students. The study design utilized a quantitative approach so as to identify the existing relationship between students' physical fitness levels to student academic

achievement, as well as pairing them together to compare fitness level scores and performance scores.

The collected data were analyzed using descriptive statics, such as minimum, maximum, mean and standard deviation and Pearson correlation. Based on the results of the data analysis, the major findings of the study summarized as follows. The study revealed that:

1. What does the relationship between physical fitness and students' academic performance look like?

- The relation between students fitness level and academic performance, the results of the sit and reach test, exhibited significant negative correlations (r = -0.283) at p-value 0.013 in male participants. The result of curl up test showed significant positive correlation (r= 0.265, 0.469 and 0.331) at (p< 0.05) with academic achievement in male, female and total group participants respectively. The results of the push-up test, exhibited significant positive correlations (r = 0.25) and (r=0.177) at p-value 0.030 and 0.32 in female and total group participants respectively. The results of body mass index test, exhibited significant positive correlations (r = 0.288) and (r = 0.215) at p-value 0.013 and 0.008 in female and total group participants.

2. Is there a significant difference between selected fitness components tests with academic results among students?

- The correlation of unfit participants fitness result with academic performance shows as the results of the sit and reach test has no significant correlation value in all groups. But the result of curl up test exhibited significant negative correlations (r = -0.350) at p-value 0.07 and also the result of push up test showed significant negative correlation (r= -0.495 and r = -0.328) at p-value 0.09 and 0.013 in female and total group participants respectively. The results of one mile run test, exhibited significant positive correlations (r = 0.340) at p-value 0.09. The result of body mass index showed that no significant correlation between fitness test and academic achievement.

3. What does the result in academic and physical fitness tests of participants (female and male students) look like?

- The mean difference between the two groups is 6.137 at p-value 0.000. This implies that the difference in means is statistically significant at the p-value = 0.05 levels. This implying that physical fitness and academic achievement have a direct relationship, as fitness level increases, academic achievement also increases.

4. Do physically fit students or physically unfit students score high academic results?

- According to the standards for health related fitness zone 87 of the male students and 59 of the female students fitness scores fell in the Healthy Fitness Zone (meets health- related standard). So 146 students find to be physically fit. Similarly, 96 of the male students and 106 of the female student's fitness scores fell in the needs Improvement Zone (does not meet health- related standard). So 202 students find to be physically unfit.

## 5.2. Conclusions

Based on the findings of the study the following conclusions were drawn.

The results of this study suggest a positive relationship between physical fitness components and academic achievement in secondary school students in Guji Zone of Oromia Regional state, with more significant correlations found among females than males.

Participating in physical activity had a significant effect on the improvement and enhancement of physical fitness performance and improved academic achievements. The school participants, who took part in the practical teaching of physical education had improve their physical fitness and academic achievement as compared to physically unfit groups. Participation in regular exercises is very important for students for overall development.

There was a strong correlation between academic achievement and physical fitness. The physical fitness and academic achievement have a direct relationship.

## 5.3. Recommendations

Based on the findings and conclusions made above, the researcher forwarded the following recommendations.

1. The positive correlation (association) of physical fitness with that of academic achievement is not understood in our community so in this regard the government body with the physical education professionals and with the school communities, is expected to raise awareness the society to have awareness about the positive relation between physical fitness and academic achievement.
2. In this study cardiovascular fitness showed high significant correlation with academic achievement. So Teachers physical activity should focus on health related physical fitness especially cardiovascular endurance activities to increase students' academic achievement.
3. Physical education classes provide great opportunities for students to achieve fitness Goals for themselves. School leaders, administrators, and teachers need to recognize the importance of having a quality physical education program at their schools. Cited research from this study indicated there are several cognitive, psychological, and physical benefits associated with physical education class in schools.
4. The researcher wishes further studies to be carried on in this arena specially in the area of correlations of skill related physical fitness and academic achievements by taking the sample from those who had physical performance as an independent variable, whereas academic achievement as a dependent variable and publications to be proliferated.
5. The study recommends for future research would be to employ the same instruments, variables and procedures and compare the physical fitness level and academic achievements among the rural and urban students in both sexes because in the study area the rural students are more vulnerable than urban students.

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# Appendix A

**Addis Ababa University**
**School of Graduate Studies**
**Department of Science and mathematics Education**

## Physical Fitness Measurement record sheet

**Student Information**

1. Sex Male ☐ Female ☐

2. Age _____

3. Grade _____

4. School _____

| Health-related component | Tests | Score |
|---|---|---|
| Cardiovascular endurance | One-mile run | |
| Flexibility | Sit-and –reach | |
| Upper body muscular strength and endurance | $90^{o}$ push- ups | |
| Lower body muscular strength and endurance | Curl- up | |
| Body composition | Body mass Index (BMI) | |

# Appendix B

**Addis Ababa University**
**School of Graduate Studies**
**Department of Science and mathematics Education**

## Academic Achievement record sheet

**Student Information**

1. Sex Male ☐ F ☐

2. Age_____

3. Grade _____

4. School _____

| Subject | First Semester exam Result (Average) |
|---|---|
| English | |
| Mathematics | |
| Biology | |
| Chemistry | |
| History | |
| Geography | |
| Average | |

# Appendix C

**Addis Ababa University**
**School of Graduate Studies**
**Department of Science and mathematics Education**

## Males Fitness test result

| No | Sit | Curl | push | 1mile | BMI |
|---|---|---|---|---|---|
| **1** | 8 | 25 | 8 | 7.1 | 19.1 |
| **2** | 9 | 40 | 19 | 8.3 | 15.2 |
| **3** | 8 | 34 | 20 | 7.2 | 14.6 |
| **4** | 9 | 26 | 30 | 8.15 | 17.6 |
| **5** | 11 | 25 | 18 | 7.2 | 15.6 |
| **6** | 14 | 30 | 19 | 8.15 | 19.4 |
| **7** | 10 | 40 | 20 | 7.45 | 16.3 |
| **8** | 12 | 31 | 31 | 8.1 | 17.6 |
| **9** | 14 | 26 | 34 | 7.15 | 15.5 |
| **10** | 8 | 24 | 35 | 8.3 | 16.7 |
| **11** | 9 | 33 | 20 | 7.22 | 18.2 |
| **12** | 10 | 31 | 18 | 7.3 | 16 |
| **13** | 8 | 26 | 19 | 7 | 17 |
| **14** | 8 | 32 | 31 | 8 | 18.9 |
| **15** | 9 | 31 | 19 | 7.45 | 20 |
| **16** | 10 | 25 | 21 | 7.1 | 16.5 |
| **17** | 11 | 36 | 30 | 7.35 | 17.6 |
| **18** | 12 | 40 | 23 | 7 | 16.7 |
| **19** | 9 | 41 | 22 | 8 | 17.1 |
| **20** | 9 | 43 | 19 | 8.3 | 15.6 |
| **21** | 8 | 25 | 34 | 7.2 | 19.6 |
| **22** | 10 | 24 | 31 | 7.15 | 16.4 |
| **23** | 11 | 31 | 20 | 8.2 | 16.7 |
| **24** | 12 | 36 | 18 | 8.15 | 16.4 |
| **25** | 13 | 33 | 19 | 7.3 | 16.9 |
| **26** | 9 | 34 | 20 | 8.13 | 17.2 |
| **27** | 8 | 27 | 19 | 7.4 | 19.4 |
| **28** | 10 | 28 | 30 | 8.3 | 16.7 |
| **29** | 11 | 36 | 19 | 7.15 | 17.2 |
| **30** | 12 | 37 | 18 | 8 | 16.4 |
| **31** | 13 | 40 | 34 | 7.2 | 16.2 |
| **32** | 10 | 41 | 32 | 8.9 | 18.1 |
| **33** | 9 | 44 | 20 | 7.34 | 19 |
| **34** | 8 | 32 | 19 | 8.15 | 20.1 |
| **35** | 10 | 36 | 33 | 8.2 | 17.2 |
| **36** | 9 | 41 | 32 | 7.13 | 16.4 |
| **37** | 8 | 40 | 18 | 8.2 | 15.9 |
| **38** | 9 | 29 | 19 | 7.15 | 16.3 |
| **39** | 10 | 26 | 20 | 7.1 | 16.5 |
| **40** | 11 | 31 | 32 | 8.26 | 17.8 |
| **41** | 8 | 35 | 19 | 7.16 | 21.2 |
| **42** | 8 | 34 | 18 | 8.23 | 17.4 |
| **43** | 9 | 33 | 19 | 7.4 | 18.7 |
| **44** | 10 | 27 | 30 | 8.2 | 19.2 |
| **45** | 10 | 29 | 19 | 7.32 | 16.5 |
| **46** | 9 | 31 | 32 | 7.4 | 17 |
| **47** | 8 | 36 | 30 | 8.15 | 18.1 |
| **48** | 6 | 16 | 12 | 9.1 | 14.5 |
| **49** | 6 | 17 | 14 | 10.1 | 16.6 |
| **50** | 7 | 18 | 15 | 9.3 | 17.2 |
| **51** | 2 | 10 | 10 | 10.1 | 18.1 |
| **52** | 4 | 15 | 9 | 11.3 | 19.2 |
| **53** | 5 | 16 | 7 | 12 | 14.7 |
| **54** | 6 | 20 | 10 | 9.2 | 18.2 |
| **55** | 7 | 19 | 9 | 9.45 | 19 |
| **56** | 6 | 18 | 8 | 10.2 | 16.2 |
| **57** | 4 | 16 | 11 | 11.15 | 15.9 |
| **58** | 3 | 14 | 12 | 12.15 | 16.3 |
| **59** | 2 | 10 | 12 | 10.5 | 17.2 |
| **60** | 4 | 15 | 11 | 11.1 | 17.3 |
| **61** | 5 | 17 | 10 | 10.45 | 21.1 |
| **62** | 6 | 20 | 9 | 11.1 | 20 |
| **63** | 7 | 16 | 14 | 9.45 | 19.1 |
| **64** | 5 | 14 | 15 | 10.45 | 17.3 |
| **65** | 6 | 21 | 13 | 11 | 18.2 |
| **66** | 4 | 19 | 14 | 12.1 | 19.1 |
| **67** | 3 | 18 | 11 | 10.1 | 18.2 |
| **68** | 12 | 15 | 7 | 7.45 | 13.1 |
| **69** | 13 | 19 | 8 | 8.1 | 12.1 |
| **70** | 15 | 18 | 10 | 7.2 | 19.1 |
| **71** | 12 | 18 | 9 | 8.3 | 14.9 |
| **72** | 15 | 15 | 14 | 7.2 | 16.2 |
| **73** | 12 | 20 | 15 | 8.1 | 14 |
| **74** | 13 | 19 | 7 | 7.45 | 17.5 |
| **75** | 15 | 18 | 8 | 8.2 | 14.4 |
| **76** | 12 | 19 | 10 | 7.3 | 16.9 |
| **77** | 14 | 20 | 9 | 8 | 17.7 |
| **78** | 12 | 18 | 12 | 7.45 | 17.5 |
| **79** | 15 | 19 | 15 | 8 | 15 |
| **80** | 12 | 20 | 14 | 7.45 | 17.2 |
| **81** | 15 | 19 | 13 | 8 | 16.7 |
| **82** | 12 | 20 | 15 | 7.15 | 17.9 |
| **83** | 12 | 18 | 12 | 8 | 15.9 |
| **84** | 14 | 19 | 8 | 7.15 | 17.9 |
| **85** | 13 | 20 | 9 | 8.2 | 16.5 |
| **86** | 15 | 21 | 10 | 8.1 | 14 |
| **87** | 13 | 22 | 10 | 7.45 | 17 |
| **88** | 14 | 23 | 11 | 8.4 | 14.9 |
| **89** | 15 | 25 | 12 | 7.35 | 15.7 |
| **90** | 12 | 19 | 15 | 8.4 | 16.6 |
| **91** | 12 | 25 | 9 | 7.35 | 16.8 |
| **92** | 12 | 19 | 8 | 8.4 | 14.1 |
| **93** | 15 | 25 | 7 | 7.15 | 15.4 |
| **94** | 12 | 19 | 10 | 8.4 | 15.3 |
| **95** | 15 | 20 | 12 | 8.35 | 17.3 |
| **96** | 12 | 23 | 10 | 8.4 | 16.5 |
| **97** | 9 | 10 | 7 | 9.15 | 18.4 |
| **98** | 8 | 9 | 8 | 10 | 18.4 |
| **99** | 11 | 15 | 7 | 8.15 | 15.5 |
| **100** | 8 | 10 | 9 | 8 | 12.8 |
| **101** | 9 | 15 | 8 | 9.15 | 15.4 |
| **102** | 9 | 11 | 7 | 10 | 15.8 |
| **103** | 10 | 9 | 8 | 9.1 | 13.9 |
| **104** | 11 | 8 | 9 | 8.45 | 16.3 |
| **105** | 8 | 8 | 7 | 9 | 17.2 |
| **106** | 7 | 10 | 10 | 8.2 | 14.9 |
| **107** | 6 | 11 | 12 | 9.1 | 15.8 |
| **108** | 9 | 44 | 20 | 7.34 | 19 |
| **109** | 8 | 32 | 19 | 8.15 | 20.1 |
| **110** | 10 | 36 | 33 | 8.2 | 17.2 |
| **111** | 9 | 41 | 32 | 7.13 | 16.4 |
| **112** | 8 | 40 | 18 | 8.2 | 15.9 |
| **113** | 9 | 29 | 19 | 7.15 | 16.3 |
| **114** | 10 | 26 | 20 | 7.1 | 16.5 |
| **115** | 11 | 31 | 32 | 8.26 | 17.8 |
| **116** | 8 | 35 | 19 | 7.16 | 21.2 |
| **117** | 8 | 34 | 18 | 8.23 | 17.4 |
| **118** | 9 | 33 | 19 | 7.4 | 18.7 |
| **119** | 10 | 27 | 30 | 8.2 | 19.2 |
| **120** | 10 | 29 | 19 | 7.32 | 16.5 |
| **121** | 9 | 31 | 32 | 7.4 | 17 |
| **122** | 8 | 36 | 30 | 8.15 | 18.1 |
| **123** | 6 | 16 | 12 | 9.1 | 14.5 |
| **124** | 6 | 17 | 14 | 10.1 | 16.6 |
| **125** | 7 | 18 | 15 | 9.3 | 17.2 |
| **126** | 2 | 10 | 10 | 10.1 | 18.1 |
| **127** | 4 | 15 | 9 | 11.3 | 19.2 |
| **128** | 5 | 16 | 7 | 12 | 14.7 |
| **129** | 6 | 20 | 10 | 9.2 | 18.2 |
| **130** | 7 | 19 | 9 | 9.45 | 19 |
| **131** | 6 | 18 | 8 | 10.2 | 16.2 |
| **132** | 4 | 16 | 11 | 11.15 | 15.9 |
| **133** | 3 | 14 | 12 | 12.15 | 16.3 |
| **134** | 2 | 10 | 12 | 10.5 | 17.2 |
| **135** | 4 | 15 | 11 | 11.1 | 17.3 |
| **136** | 5 | 17 | 10 | 10.45 | 21.1 |
| **137** | 6 | 20 | 9 | 11.1 | 20 |
| **138** | 7 | 16 | 14 | 9.45 | 19.1 |
| **139** | 5 | 14 | 15 | 10.45 | 17.3 |
| **140** | 6 | 21 | 13 | 11 | 18.2 |
| **141** | 4 | 19 | 14 | 12.1 | 19.1 |
| **142** | 3 | 18 | 11 | 10.1 | 18.2 |
| **143** | 12 | 15 | 7 | 7.45 | 13.1 |
| **144** | 13 | 19 | 8 | 8.1 | 12.1 |
| **145** | 15 | 18 | 10 | 7.2 | 19.1 |
| **146** | 12 | 18 | 9 | 8.3 | 14.9 |
| **147** | 15 | 15 | 14 | 7.2 | 16.2 |
| **148** | 12 | 20 | 15 | 8.1 | 14 |
| **149** | 13 | 19 | 7 | 7.45 | 17.5 |
| **150** | 15 | 18 | 8 | 8.2 | 14.4 |
| **151** | 12 | 19 | 10 | 7.3 | 16.9 |
| **152** | 14 | 20 | 9 | 8 | 17.7 |
| **153** | 12 | 18 | 12 | 7.45 | 17.5 |
| **154** | 15 | 19 | 15 | 8 | 15 |
| **155** | 12 | 20 | 14 | 7.45 | 17.2 |
| **156** | 15 | 19 | 13 | 8 | 16.7 |
| **157** | 12 | 20 | 15 | 7.15 | 17.9 |
| **158** | 12 | 18 | 12 | 8 | 15.9 |
| **159** | 14 | 19 | 8 | 7.15 | 17.9 |
| **160** | 13 | 20 | 9 | 8.2 | 16.5 |
| **161** | 15 | 21 | 10 | 8.1 | 14 |
| **162** | 13 | 22 | 10 | 7.45 | 17 |
| **163** | 14 | 23 | 11 | 8.4 | 14.9 |
| **164** | 15 | 25 | 12 | 7.35 | 15.7 |
| **165** | 12 | 19 | 15 | 8.4 | 16.6 |
| **166** | 12 | 25 | 9 | 7.35 | 16.8 |
| **167** | 12 | 19 | 8 | 8.4 | 14.1 |
| **168** | 15 | 25 | 7 | 7.15 | 15.4 |

| | | | | | |
|---|---|---|---|---|---|
| **169** | 12 | 19 | 10 | 8.4 | 15.3 |
| **170** | 15 | 20 | 12 | 8.35 | 17.3 |
| **171** | 12 | 23 | 10 | 8.4 | 16.5 |
| **172** | 9 | 10 | 7 | 9.15 | 18.4 |
| **173** | 8 | 9 | 8 | 10 | 18.4 |
| **174** | 11 | 15 | 7 | 8.15 | 15.5 |
| **175** | 8 | 10 | 9 | 8 | 12.8 |

| | | | | | |
|---|---|---|---|---|---|
| **176** | 9 | 15 | 8 | 9.15 | 15.4 |
| **177** | 9 | 11 | 7 | 10 | 15.8 |
| **178** | 10 | 9 | 8 | 9.1 | 13.9 |
| **179** | 11 | 8 | 9 | 8.45 | 16.3 |
| **180** | 8 | 8 | 7 | 9 | 17.2 |

| | | | | | |
|---|---|---|---|---|---|
| **181** | 7 | 10 | 10 | 8.2 | 14.9 |
| **182** | 6 | 11 | 12 | 9.1 | 15.8 |
| **183** | 9 | 44 | 20 | 7.34 | 19 |

# Appendix D

## Addis Ababa University

## School of Graduate Studies

## Department of Science and mathematics Education

## Females Fitness test result

| No | Sit | curl | push | 1mile | BMI |
|---|---|---|---|---|---|
| **1** | 12 | 19 | 8 | 10.1 | 15.9 |
| **2** | 13 | 20 | 10 | 9.1 | 16.7 |
| **3** | 16 | 18 | 11 | 8.2 | 15.5 |
| **4** | 12 | 30 | 7 | 9.45 | 12.8 |
| **5** | 14 | 22 | 9 | 10 | 15.3 |
| **6** | 15 | 19 | 8 | 8.45 | 14.8 |
| **7** | 12 | 30 | 10 | 9.2 | 16.2 |
| **8** | 12 | 18 | 13 | 7.45 | 17.8 |
| **9** | 13 | 19 | 15 | 8.2 | 15.5 |
| **10** | 14 | 21 | 9 | 9.4 | 16.2 |
| **11** | 15 | 19 | 7 | 7.35 | 12.8 |
| **12** | 20 | 18 | 8 | 9.22 | 15.8 |
| **13** | 15 | 20 | 11 | 9.5 | 15.1 |
| **14** | 12 | 34 | 12 | 10 | 17.2 |
| **15** | 16 | 40 | 13 | 9.35 | 16 |
| **16** | 12 | 31 | 9 | 8.15 | 17.3 |
| **17** | 12 | 20 | 7 | 9.2 | 17.1 |
| **18** | 14 | 19 | 8 | 10.1 | 18.2 |
| **19** | 13 | 22 | 10 | 7 | 19.4 |
| **20** | 12 | 30 | 11 | 8.36 | 16.9 |
| **21** | 13 | 28 | 14 | 7.4 | 16.2 |
| **22** | 12 | 31 | 9 | 9 | 18.4 |
| **23** | 13 | 19 | 10 | 9.1 | 17.2 |
| **24** | 12 | 22 | 7 | 8.45 | 14.9 |
| **25** | 12 | 19 | 8 | 7.05 | 13 |
| **26** | 13 | 18 | 9 | 9.15 | 15.4 |
| **27** | 12 | 27 | 11 | 7.3 | 16.7 |
| **28** | 14 | 24 | 12 | 8.45 | 15.6 |
| **29** | 15 | 23 | 13 | 9.2 | 14.5 |
| **30** | 12 | 19 | 14 | 10.4 | 17 |
| **31** | 13 | 18 | 15 | 10.2 | 15.3 |
| **32** | 12 | 19 | 9 | 8 | 16.1 |
| **33** | 15 | 21 | 8 | 9.45 | 19.2 |
| **34** | 12 | 20 | 9 | 10.1 | 15.4 |
| **35** | 13 | 18 | 7 | 8.3 | 16.5 |
| **36** | 14 | 19 | 9 | 9.2 | 17.3 |
| **37** | 7 | 9 | 5 | 11.2 | 16.5 |
| **38** | 6 | 8 | 3 | 12.3 | 17.3 |
| **39** | 9 | 10 | 6 | 11.1 | 12.8 |
| **40** | 8 | 13 | 4 | 13.2 | 14.3 |
| **41** | 7 | 8 | 2 | 14.2 | 16.9 |
| **42** | 7 | 6 | 2 | 14.1 | 17.8 |
| **43** | 6 | 11 | 5 | 10.3 | 13.9 |
| **44** | 10 | 15 | 6 | 11.2 | 16.8 |
| **45** | 9 | 6 | 3 | 12.3 | 14.3 |
| **46** | 7 | 7 | 4 | 14.1 | 16.7 |
| **47** | 8 | 8 | 5 | 10.3 | 18.1 |
| **48** | 9 | 9 | 6 | 14.1 | 20.1 |
| **49** | 7 | 10 | 4 | 12.3 | 16.2 |
| **50** | 6 | 11 | 3 | 13.1 | 15.6 |
| **51** | 3 | 13 | 2 | 10.4 | 16.4 |
| **52** | 5 | 5 | 5 | 11.2 | 17.6 |
| **53** | 4 | 8 | 6 | 10.5 | 16.3 |
| **54** | 9 | 31 | 39 | 7 | 15.8 |
| **55** | 8 | 26 | 19 | 7.36 | 15 |
| **56** | 8 | 24 | 19 | 8.2 | 9.1 |
| **57** | 8 | 25 | 30 | 8 | 18.8 |
| **58** | 8 | 26 | 27 | 8.15 | 17.5 |
| **59** | 8 | 25 | 28 | 7.36 | 16.9 |
| **60** | 8 | 24 | 30 | 8.22 | 15.1 |
| **61** | 8 | 25 | 27 | 8.3 | 14.5 |
| **62** | 9 | 30 | 37 | 8 | 15 |
| **63** | 8 | 31 | 18 | 7.36 | 14.6 |
| **64** | 8 | 25 | 19 | 8.3 | 15.2 |
| **65** | 8 | 19 | 20 | 7.15 | 15.5 |
| **66** | 8 | 18 | 18 | 7.15 | 13.1 |
| **67** | 9 | 24 | 19 | 8.2 | 16.3 |
| **68** | 8 | 24 | 20 | 8.16 | 14.1 |
| **69** | 9 | 40 | 34 | 7.1 | 17.8 |
| **70** | 8 | 26 | 18 | 8.17 | 15.9 |
| **71** | 9 | 39 | 31 | 7.5 | 19.1 |
| **72** | 9 | 33 | 30 | 8.1 | 14.2 |
| **73** | 8 | 27 | 19 | 8.19 | 17.7 |
| **74** | 8 | 30 | 22 | 8.2 | 16.7 |
| **75** | 8 | 28 | 19 | 8.23 | 14.3 |
| **76** | 8 | 31 | 29 | 8.3 | 17.3 |
| **77** | 8 | 41 | 33 | 7.15 | 15.7 |
| **78** | 9 | 43 | 44 | 8 | 17.3 |
| **79** | 8 | 25 | 18 | 8.24 | 15.5 |
| **80** | 8 | 19 | 19 | 8.26 | 15.9 |
| **81** | 8 | 18 | 20 | 8.27 | 15.8 |
| **82** | 8 | 24 | 18 | 8.29 | 17.6 |
| **83** | 8 | 25 | 19 | 8.3 | 15.9 |
| **84** | 9 | 24 | 19 | 8.3 | 16.3 |
| **85** | 8 | 32 | 31 | 8.25 | 17.3 |
| **86** | 9 | 25 | 19 | 8.3 | 18.3 |
| **87** | 10 | 26 | 18 | 8.15 | 17.4 |
| **88** | 9 | 37 | 32 | 8.15 | 20.6 |
| **89** | 9 | 42 | 36 | 8 | 17.9 |
| **90** | 10 | 29 | 20 | 8.14 | 17.4 |
| **91** | 8 | 27 | 19 | 8.15 | 15.4 |
| **92** | 6 | 16 | 6 | 10.1 | 14.7 |
| **93** | 5 | 13 | 10 | 9.15 | 15.6 |
| **94** | 7 | 15 | 9 | 10.3 | 16.3 |
| **95** | 6 | 12 | 15 | 9.15 | 14.7 |
| **96** | 4 | 10 | 9 | 9.2 | 19 |
| **97** | 3 | 13 | 8 | 9.15 | 14.5 |
| **98** | 5 | 14 | 13 | 11.2 | 17.5 |
| **99** | 4 | 15 | 12 | 12 | 17.3 |
| **100** | 3 | 12 | 10 | 12.1 | 22.6 |
| **101** | 2 | 10 | 8 | 9.45 | 15.9 |
| **102** | 7 | 9 | 5 | 11.2 | 16.5 |
| **103** | 6 | 8 | 3 | 12.3 | 17.3 |
| **104** | 9 | 10 | 6 | 11.1 | 12.8 |
| **105** | 8 | 13 | 4 | 13.2 | 14.3 |
| **106** | 7 | 8 | 2 | 14.2 | 16.9 |
| **107** | 7 | 6 | 2 | 14.1 | 17.8 |
| **108** | 6 | 11 | 5 | 10.3 | 13.9 |
| **109** | 10 | 15 | 6 | 11.2 | 16.8 |
| **110** | 9 | 6 | 3 | 12.3 | 14.3 |
| **111** | 7 | 7 | 4 | 14.1 | 16.7 |
| **112** | 8 | 8 | 5 | 10.3 | 18.1 |
| **113** | 9 | 9 | 6 | 14.1 | 20.1 |
| **114** | 7 | 10 | 4 | 12.3 | 16.2 |
| **115** | 6 | 11 | 3 | 13.1 | 15.6 |
| **116** | 3 | 13 | 2 | 10.4 | 16.4 |
| **117** | 5 | 5 | 5 | 11.2 | 17.6 |

| | | | | | |
|---|---|---|---|---|---|
| **118** | 4 | 8 | 6 | 10.5 | 16.3 |
| **119** | 9 | 31 | 39 | 7 | 15.8 |
| **120** | 8 | 26 | 19 | 7.36 | 15 |
| **121** | 8 | 24 | 19 | 8.2 | 9.1 |
| **122** | 8 | 25 | 30 | 8 | 18.8 |
| **123** | 8 | 26 | 27 | 8.15 | 17.5 |
| **124** | 8 | 25 | 28 | 7.36 | 16.9 |
| **125** | 8 | 24 | 30 | 8.22 | 15.1 |
| **126** | 8 | 25 | 27 | 8.3 | 14.5 |
| **127** | 9 | 30 | 37 | 8 | 15 |
| **128** | 8 | 31 | 18 | 7.36 | 14.6 |
| **129** | 8 | 25 | 19 | 8.3 | 15.2 |
| **130** | 8 | 19 | 20 | 7.15 | 15.5 |
| **131** | 8 | 18 | 18 | 7.15 | 13.1 |
| **132** | 9 | 24 | 19 | 8.2 | 16.3 |
| **133** | 8 | 24 | 20 | 8.16 | 14.1 |
| **134** | 9 | 40 | 34 | 7.1 | 17.8 |
| **135** | 8 | 26 | 18 | 8.17 | 15.9 |
| **136** | 9 | 39 | 31 | 7.5 | 19.1 |
| **137** | 9 | 33 | 30 | 8.1 | 14.2 |
| **138** | 8 | 27 | 19 | 8.19 | 17.7 |
| **139** | 8 | 30 | 22 | 8.2 | 16.7 |
| **140** | 8 | 28 | 19 | 8.23 | 14.3 |
| **141** | 8 | 31 | 29 | 8.3 | 17.3 |
| **142** | 8 | 41 | 33 | 7.15 | 15.7 |
| **143** | 9 | 43 | 44 | 8 | 17.3 |
| **144** | 8 | 25 | 18 | 8.24 | 15.5 |
| **145** | 8 | 19 | 19 | 8.26 | 15.9 |
| **146** | 8 | 18 | 20 | 8.27 | 15.8 |
| **147** | 8 | 24 | 18 | 8.29 | 17.6 |
| **148** | 8 | 25 | 19 | 8.3 | 15.9 |
| **149** | 9 | 24 | 19 | 8.3 | 16.3 |
| **150** | 8 | 32 | 31 | 8.25 | 17.3 |
| **151** | 9 | 25 | 19 | 8.3 | 18.3 |
| **152** | 10 | 26 | 18 | 8.15 | 17.4 |
| **153** | 9 | 37 | 32 | 8.15 | 20.6 |
| **154** | 9 | 42 | 36 | 8 | 17.9 |
| **155** | 10 | 29 | 20 | 8.14 | 17.4 |
| **156** | 8 | 27 | 19 | 8.15 | 15.4 |
| **157** | 6 | 16 | 6 | 10.1 | 14.7 |
| **158** | 5 | 13 | 10 | 9.15 | 15.6 |
| **159** | 7 | 15 | 9 | 10.3 | 16.3 |
| **160** | 6 | 12 | 15 | 9.15 | 14.7 |
| **161** | 4 | 10 | 9 | 9.2 | 19 |
| **162** | 3 | 13 | 8 | 9.15 | 14.5 |
| **163** | 5 | 14 | 13 | 11.2 | 17.5 |
| **164** | 4 | 15 | 12 | 12 | 17.3 |
| **165** | 3 | 12 | 10 | 12.1 | 22.6 |

# Appendix E

## Addis Ababa University

## School of Graduate Studies

## Department of Science and mathematics Education

# Grade 9 Students Academic Result

| No | En | Ma | Ch | Bi | Ge | Hi | Av |
|---|---|---|---|---|---|---|---|
| 1 | 70 | 59 | 74 | 69 | 60 | 59 | 65.17 |
| 2 | 58 | 66 | 67 | 61 | 52 | 57 | 60.17 |
| 3 | 75 | 62 | 56 | 50 | 65 | 59 | 61.17 |
| 4 | 72 | 67 | 65 | 74 | 60 | 60 | 66.33 |
| 5 | 76 | 65 | 69 | 67 | 57 | 66 | 66.67 |
| 6 | 60 | 69 | 52 | 52 | 50 | 50 | 55.50 |
| 7 | 70 | 55 | 75 | 75 | 53 | 58 | 64.33 |
| 8 | 69 | 68 | 67 | 67 | 69 | 56 | 66.00 |
| 9 | 69 | 78 | 50 | 50 | 65 | 60 | 62.00 |
| 10 | 66 | 73 | 57 | 56 | 56 | 59 | 61.17 |
| 11 | 61 | 53 | 87 | 88 | 58 | 63 | 68.33 |
| 12 | 67 | 80 | 68 | 94 | 59 | 64 | 72.00 |
| 13 | 59 | 65 | 64 | 76 | 53 | 50 | 61.17 |
| 14 | 54 | 70 | 78 | 68 | 50 | 50 | 61.67 |
| 15 | 60 | 69 | 67 | 100 | 92 | 52 | 73.33 |
| 16 | 56 | 56 | 92 | 88 | 67 | 60 | 69.83 |
| 17 | 68 | 53 | 96 | 96 | 87 | 65 | 77.50 |
| 18 | 59 | 73 | 68 | 99 | 100 | 58 | 76.17 |
| 19 | 57 | 50 | 75 | 95 | 94 | 70 | 73.50 |
| 20 | 59 | 59 | 69 | 86 | 63 | 70 | 67.67 |
| 21 | 69 | 51 | 97 | 82 | 62 | 66 | 71.17 |
| 22 | 55 | 85 | 73 | 98 | 72 | 60 | 73.83 |
| 23 | 67 | 50 | 73 | 69 | 51 | 54 | 60.67 |
| 24 | 59 | 58 | 76 | 59 | 53 | 58 | 60.50 |
| 25 | 83 | 54 | 100 | 69 | 50 | 85 | 73.50 |
| 26 | 54 | 94 | 74 | 69 | 50 | 72 | 68.83 |
| 27 | 55 | 52 | 89 | 61 | 51 | 62 | 61.67 |
| 28 | 57 | 71 | 82 | 68 | 51 | 72 | 66.83 |
| 29 | 56 | 65 | 85 | 84 | 57 | 76 | 70.50 |
| 30 | 58 | 50 | 90 | 72 | 51 | 56 | 62.83 |
| 31 | 64 | 66 | 86 | 85 | 53 | 64 | 69.67 |
| 32 | 54 | 67 | 61 | 98 | 63 | 54 | 66.17 |
| 33 | 63 | 50 | 100 | 68 | 50 | 81 | 68.67 |
| 34 | 55 | 65 | 83 | 77 | 57 | 81 | 69.67 |
| 35 | 80 | 55 | 97 | 67 | 59 | 67 | 70.83 |
| 36 | 80 | 97 | 94 | 100 | 84 | 96 | 91.83 |
| 37 | 80 | 100 | 64 | 79 | 50 | 76 | 74.83 |
| 38 | 80 | 93 | 63 | 84 | 61 | 60 | 78.50 |
| 39 | 75 | 57 | 51 | 77 | 59 | 55 | 62.33 |
| 40 | 68 | 56 | 52 | 66 | 54 | 49 | 57.50 |
| 41 | 67 | 62 | 58 | 70 | 50 | 70 | 62.83 |
| 42 | 54 | 72 | 60 | 72 | 54 | 65 | 62.83 |
| 43 | 40 | 46 | 40 | 56 | 49 | 46 | 46.17 |
| 44 | 45 | 36 | 40 | 38 | 41 | 42 | 40.33 |
| 45 | 45 | 60 | 40 | 47 | 47 | 56 | 49.17 |
| 46 | 43 | 52 | 44 | 40 | 52 | 60 | 48.50 |
| 47 | 59 | 40 | 54 | 43 | 54 | 43 | 48.83 |
| 48 | 50 | 49 | 45 | 45 | 42 | 48 | 46.50 |
| 49 | 43 | 46 | 40 | 46 | 40 | 40 | 42.50 |
| 50 | 43 | 44 | 44 | 46 | 49 | 50 | 46.00 |
| 51 | 46 | 47 | 46 | 45 | 43 | 45 | 45.33 |
| 52 | 40 | 46 | 46 | 47 | 48 | 44 | 45.17 |
| 53 | 42 | 45 | 45 | 43 | 42 | 42 | 43.17 |
| 54 | 45 | 43 | 44 | 45 | 46 | 44 | 44.50 |
| 55 | 40 | 43 | 45 | 45 | 45 | 46 | 44.00 |
| 56 | 42 | 42 | 46 | 44 | 45 | 46 | 44.17 |
| 57 | 41 | 42 | 42 | 41 | 40 | 40 | 41.00 |
| 58 | 45 | 46 | 45 | 47 | 46 | 46 | 45.83 |
| 59 | 42 | 43 | 40 | 43 | 45 | 45 | 43.00 |
| 60 | 43 | 43 | 40 | 42 | 45 | 46 | 43.17 |
| 61 | 40 | 42 | 42 | 42 | 46 | 43 | 42.50 |
| 62 | 40 | 42 | 40 | 41 | 45 | 45 | 42.17 |
| 63 | 67 | 69 | 42 | 50 | 66 | 68 | 60.33 |
| 64 | 58 | 60 | 72 | 77 | 70 | 83 | 70.00 |
| 65 | 82 | 63 | 77 | 66 | 69 | 80 | 72.83 |
| 66 | 69 | 55 | 51 | 70 | 92 | 91 | 71.33 |
| 67 | 75 | 54 | 58 | 72 | 43 | 57 | 59.83 |
| 68 | 50 | 45 | 58 | 56 | 67 | 68 | 57.33 |
| 69 | 75 | 73 | 51 | 38 | 64 | 67 | 61.33 |
| 70 | 76 | 62 | 74 | 47 | 90 | 83 | 72.00 |
| 71 | 76 | 71 | 43 | 50 | 76 | 72 | 64.67 |
| 72 | 61 | 62 | 50 | 65 | 65 | 72 | 62.50 |
| 73 | 91 | 65 | 50 | 60 | 58 | 60 | 64.00 |
| 74 | 74 | 69 | 56 | 52 | 62 | 78 | 65.17 |
| 75 | 76 | 70 | 65 | 70 | 84 | 83 | 74.67 |
| 76 | 71 | 51 | 60 | 44 | 77 | 78 | 65.50 |
| 77 | 72 | 61 | 48 | 63 | 52 | 45 | 56.83 |
| 78 | 43 | 49 | 66 | 79 | 90 | 74 | 66.83 |
| 79 | 79 | 61 | 69 | 51 | 74 | 62 | 66.00 |
| 80 | 83 | 58 | 54 | 54 | 66 | 70 | 64.17 |
| 81 | 71 | 55 | 69 | 56 | 84 | 84 | 69.83 |
| 82 | 72 | 65 | 50 | 71 | 56 | 76 | 65.00 |
| 83 | 76 | 59 | 63 | 50 | 86 | 81 | 69.17 |
| 84 | 66 | 57 | 55 | 53 | 71 | 73 | 62.50 |
| 85 | 83 | 61 | 55 | 55 | 65 | 89 | 68.00 |
| 86 | 83 | 56 | 60 | 77 | 65 | 53 | 65.67 |
| 87 | 79 | 55 | 87 | 51 | 89 | 88 | 74.83 |
| 88 | 48 | 53 | 75 | 52 | 75 | 80 | 63.83 |
| 89 | 85 | 63 | 64 | 44 | 69 | 84 | 68.17 |
| 90 | 68 | 71 | 56 | 51 | 67 | 69 | 63.67 |
| 91 | 69 | 71 | 69 | 46 | 82 | 80 | 69.50 |
| 92 | 68 | 81 | 68 | 66 | 80 | 73 | 73.67 |
| 93 | 67 | 71 | 70 | 61 | 76 | 76 | 70.17 |
| 94 | 64 | 55 | 57 | 69 | 64 | 54 | 60.50 |
| 95 | 73 | 60 | 56 | 56 | 62 | 62 | 61.50 |
| 96 | 81 | 66 | 53 | 61 | 84 | 60 | 67.50 |
| 97 | 89 | 74 | 59 | 48 | 73 | 83 | 71.00 |
| 98 | 56 | 50 | 62 | 47 | 67 | 74 | 59.33 |
| 99 | 67 | 60 | 65 | 65 | 70 | 69 | 66.00 |
| 100 | 67 | 58 | 50 | 53 | 66 | 69 | 60.17 |
| 101 | 61 | 48 | 51 | 52 | 65 | 66 | 57.17 |
| 102 | 81 | 59 | 53 | 58 | 51 | 65 | 61.17 |
| 103 | 43 | 47 | 54 | 57 | 65 | 70 | 56.00 |
| 104 | 78 | 56 | 49 | 54 | 60 | 56 | 58.83 |
| 105 | 88 | 70 | 42 | 53 | 52 | 82 | 64.50 |
| 106 | 66 | 53 | 48 | 49 | 53 | 53 | 53.67 |
| 107 | 68 | 52 | 58 | 52 | 65 | 83 | 63.00 |
| 108 | 52 | 49 | 63 | 50 | 90 | 78 | 63.67 |
| 109 | 53 | 44 | 45 | 49 | 69 | 70 | 55.00 |
| 110 | 50 | 46 | 60 | 49 | 56 | 71 | 55.33 |
| 111 | 49 | 42 | 65 | 50 | 54 | 70 | 55.00 |
| 112 | 46 | 40 | 55 | 54 | 65 | 67 | 54.50 |
| 113 | 80 | 68 | 50 | 68 | 70 | 53 | 64.83 |
| 114 | 80 | 68 | 50 | 78 | 61 | 60 | 66.17 |
| 115 | 61 | 64 | 67 | 74 | 60 | 60 | 64.33 |
| 116 | 71 | 57 | 69 | 86 | 52 | 60 | 65.83 |
| 117 | 70 | 88 | 84 | 72 | 81 | 57 | 75.33 |
| 118 | 60 | 60 | 50 | 61 | 70 | 56 | 59.50 |
| 119 | 60 | 55 | 78 | 70 | 61 | 64 | 64.67 |
| 120 | 76 | 67 | 65 | 83 | 70 | 62 | 70.50 |
| 121 | 67 | 80 | 51 | 60 | 71 | 68 | 66.17 |
| 122 | 62 | 74 | 51 | 56 | 80 | 59 | 63.67 |
| 123 | 62 | 74 | 51 | 56 | 59 | 59 | 60.17 |
| 124 | 61 | 65 | 66 | 69 | 59 | 72 | 65.33 |
| 125 | 67 | 57 | 100 | 92 | 50 | 70 | 72.67 |
| 126 | 58 | 56 | 81 | 74 | 93 | 62 | 70.67 |
| 127 | 64 | 55 | 62 | 79 | 64 | 58 | 63.67 |
| 128 | 57 | 57 | 77 | 63 | 72 | 82 | 68.00 |
| 129 | 72 | 62 | 77 | 77 | 53 | 64 | 67.50 |
| 130 | 60 | 63 | 65 | 86 | 53 | 82 | 68.17 |
| 131 | 65 | 59 | 73 | 75 | 72 | 76 | 70.00 |
| 132 | 57 | 58 | 80 | 89 | 68 | 76 | 71.33 |
| 133 | 66 | 52 | 72 | 77 | 75 | 64 | 67.67 |
| 134 | 60 | 65 | 65 | 78 | 54 | 62 | 64.00 |
| 135 | 69 | 61 | 91 | 84 | 100 | 73 | 79.67 |
| 136 | 69 | 62 | 76 | 88 | 50 | 66 | 68.50 |
| 137 | 63 | 63 | 73 | 97 | 61 | 62 | 69.83 |

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **138** | 63 | 74 | 94 | 88 | 60 | 62 | **162** | 50 | 43 | 41 | 49 | 47 | 50 | 41 | **186** | 17 | 76 | 52 | 85 | 71 | 77 | 83 | 74.00 |
| **139** | 68 | 77 | 84 | 90 | 56 | 70 | **163** | 17 | 43 | 41 | 45 | 45 | 42 | 42 | **187** | 00 | 71 | 65 | 83 | 72 | 74 | 75 | 73.33 |
| **140** | 79 | 81 | 85 | 93 | 50 | 56 | **164** | 00 | 43 | 42 | 44 | 46 | 41 | 43 | **188** | 17 | 52 | 50 | 77 | 56 | 75 | 77 | 64.50 |
| **141** | 58 | 77 | 83 | 84 | 57 | 60 | **165** | 83 | 42 | 42 | 45 | 45 | 42 | 42 | **189** | 00 | 64 | 55 | 77 | 58 | 69 | 79 | 67.00 |
| **142** | 76 | 61 | 91 | 80 | 70 | 78 | **166** | 00 | 41 | 41 | 44 | 46 | 45 | 40 | **190** | 83 | 69 | 74 | 72 | 69 | 74 | 73 | 71.83 |
| **143** | 53 | 79 | 76 | 90 | 66 | 80 | **167** | 00 | 40 | 40 | 47 | 42 | 46 | 40 | **191** | 50 | 66 | 65 | 72 | 63 | 79 | 93 | 73.00 |
| **144** | 56 | 51 | 50 | 75 | 65 | 96 | **168** | 50 | 46 | 40 | 48 | 43 | 42 | 46 | **192** | 17 | 76 | 78 | 84 | 92 | 87 | 84 | 83.50 |
| **145** | 56 | 91 | 68 | 79 | 67 | 74 | **169** | 50 | 47 | 41 | 43 | 42 | 47 | 43 | **193** | 83 | 66 | 67 | 81 | 78 | 84 | 82 | 76.33 |
| **146** | 59 | 70 | 56 | 80 | 51 | 54 | **170** | 67 | 45 | 47 | 43 | 44 | 48 | 45 | **194** | 33 | 73 | 67 | 81 | 80 | 78 | 87 | 77.67 |
| **147** | 58 | 52 | 58 | 72 | 94 | 58 | **171** | 33 | 60 | 59 | 76 | 68 | 77 | 79 | **195** | 83 | 62 | 74 | 75 | 83 | 88 | 87 | 78.17 |
| **148** | 60 | 66 | 82 | 74 | 74 | 82 | **172** | 00 | 61 | 54 | 75 | 74 | 85 | 77 | **196** | 00 | 60 | 56 | 77 | 63 | 78 | 70 | 67.33 |
| **149** | 58 | 57 | 87 | 54 | 53 | 64 | **173** | 17 | 70 | 57 | 80 | 71 | 86 | 81 | **197** | 17 | 77 | 52 | 76 | 74 | 74 | 77 | 71.67 |
| **150** | 60 | 67 | 54 | 54 | 75 | 64 | **174** | 33 | 69 | 50 | 77 | 63 | 81 | 78 | **198** | 67 | 66 | 54 | 77 | 66 | 84 | 77 | 70.67 |
| **151** | 54 | 71 | 54 | 60 | 74 | 82 | **175** | 83 | 54 | 75 | 58 | 53 | 79 | 68 | **199** | 50 | 67 | 75 | 75 | 82 | 70 | 90 | 76.50 |
| **152** | 60 | 60 | 50 | 52 | 56 | 76 | **176** | 00 | 75 | 76 | 71 | 78 | 74 | 95 | **200** | 17 | 63 | 98 | 68 | 82 | 89 | 82 | 80.33 |
| **153** | 74 | 67 | 66 | 70 | 53 | 64 | **177** | 67 | 39 | 54 | 64 | 48 | 52 | 57 | **201** | 33 | 78 | 66 | 77 | 81 | 81 | 89 | 78.67 |
| **154** | 43 | 40 | 45 | 45 | 43 | 50 | **178** | 33 | 69 | 79 | 77 | 73 | 76 | 79 | **202** | 50 | 65 | 72 | 67 | 76 | 78 | 80 | 73.00 |
| **155** | 43 | 43 | 46 | 50 | 43 | 43 | **179** | 67 | 75 | 54 | 77 | 75 | 82 | 85 | **203** | 67 | 56 | 51 | 71 | 73 | 83 | 69 | 67.17 |
| **156** | 44 | 41 | 45 | 53 | 45 | 45 | **180** | 50 | 64 | 59 | 79 | 53 | 80 | 76 | **204** | 50 | 57 | 55 | 81 | 70 | 90 | 91 | 74.00 |
| **157** | 45 | 40 | 45 | 45 | 48 | 43 | **181** | 33 | 70 | 53 | 77 | 70 | 73 | 71 | **205** | 00 | 33 | 66 | 72 | 60 | 87 | 77 | 65.83 |
| **158** | 46 | 40 | 46 | 43 | 49 | 46 | **182** | 00 | 50 | 66 | 62 | 63 | 75 | 86 | **206** | 00 | 66 | 80 | 72 | 70 | 80 | 94 | 77.00 |
| **159** | 43 | 42 | 47 | 42 | 49 | 49 | **183** | 33 | 68 | 51 | 69 | 69 | 74 | 74 | **207** | 50 | 61 | 54 | 50 | 49 | 81 | 78 | 62.17 |
| **160** | 42 | 43 | 48 | 44 | 42 | 50 | **184** | 83 | 81 | 87 | 77 | 80 | 83 | 93 | **208** | 50 | 53 | 60 | 58 | 50 | 82 | 70 | 62.17 |
| **161** | 42 | 41 | 45 | 46 | 41 | 43 | **185** | 00 | 74 | 63 | 77 | 80 | 80 | 89 | **209** | 17 | 73 | 81 | 85 | 86 | 89 | 90 | 84.00 |

# Appendix F

## Addis Ababa University
## School of Graduate Studies
## Department of Science and mathematics Education

# Grade 10 Students Academic Result

| | En | Ma | Ch | Bi | Ge | Hi | Av |
|---|---|---|---|---|---|---|---|
| | 77 | 77 | 64 | 80 | 84 | 60 | 73.67 |
| | 66 | 52 | 67 | 63 | 74 | 64 | 64.33 |
| | 69 | 68 | 52 | 66 | 61 | 65 | 63.50 |
| | 68 | 64 | 50 | 60 | 55 | 69 | 61.00 |
| | 63 | 60 | 78 | 57 | 64 | 59 | 63.50 |
| | 67 | 55 | 50 | 53 | 55 | 60 | 56.67 |
| | 79 | 61 | 50 | 65 | 58 | 66 | 63.17 |
| | 78 | 63 | 62 | 68 | 65 | 62 | 66.33 |
| | 57 | 68 | 85 | 86 | 85 | 70 | 75.17 |
| | 50 | 57 | 60 | 61 | 60 | 63 | 58.50 |
| | 60 | 52 | 57 | 53 | 58 | 70 | 58.33 |
| | 71 | 57 | 54 | 70 | 65 | 58 | 62.50 |
| | 70 | 64 | 50 | 67 | 70 | 50 | 61.83 |
| | 52 | 57 | 57 | 55 | 60 | 60 | 56.83 |
| | 51 | 65 | 50 | 52 | 54 | 59 | 55.17 |
| | 91 | 77 | 80 | 85 | 95 | 85 | 85.50 |
| | 62 | 55 | 50 | 68 | 75 | 84 | 65.67 |
| | 83 | 77 | 85 | 83 | 90 | 86 | 84.00 |
| | 79 | 82 | 79 | 73 | 81 | 58 | 75.33 |
| | 70 | 53 | 57 | 72 | 54 | 50 | 59.33 |
| | 60 | 69 | 68 | 76 | 86 | 81 | 73.33 |
| | 65 | 64 | 63 | 70 | 60 | 62 | 64.00 |
| | 98 | 80 | 71 | 70 | 72 | 78 | 78.17 |
| | 69 | 73 | 74 | 74 | 80 | 80 | 75.00 |
| | 60 | 75 | 83 | 73 | 70 | 50 | 68.50 |
| | 60 | 50 | 56 | 45 | 69 | 52 | 55.33 |
| | 61 | 58 | 60 | 47 | 61 | 58 | 57.50 |
| | 70 | 56 | 52 | 57 | 66 | 92 | 65.50 |
| | 62 | 59 | 59 | 50 | 72 | 94 | 66.00 |
| | 74 | 61 | 52 | 65 | 72 | 58 | 63.67 |
| | 71 | 67 | 66 | 70 | 80 | 50 | 67.33 |
| | 62 | 54 | 60 | 58 | 71 | 75 | 63.33 |
| | 89 | 56 | 71 | 64 | 58 | 63 | 66.83 |
| | 64 | 60 | 84 | 76 | 92 | 65 | 73.50 |
| | 45 | 40 | 45 | 46 | 45 | 46 | 44.50 |
| | 49 | 41 | 46 | 46 | 43 | 47 | 45.33 |
| | 40 | 42 | 47 | 45 | 45 | 48 | 44.50 |
| | 49 | 43 | 48 | 41 | 45 | 46 | 45.33 |
| | 48 | 43 | 45 | 40 | 41 | 47 | 44.00 |
| | 46 | 42 | 46 | 41 | 42 | 48 | 44.17 |
| | 45 | 42 | 45 | 40 | 40 | 40 | 42.00 |
| | 46 | 41 | 49 | 43 | 42 | 41 | 43.67 |
| | 45 | 42 | 48 | 43 | 43 | 42 | 43.83 |
| | 45 | 41 | 49 | 42 | 43 | 43 | 43.83 |
| | 49 | 43 | 48 | 41 | 43 | 41 | 44.17 |
| | 76 | 69 | 84 | 84 | 60 | 94 | 77.83 |
| | 71 | 60 | 56 | 76 | 49 | 87 | 66.50 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 80 | 63 | 86 | 81 | 81 | 83 | 79.00 | |
| 70 | 55 | 71 | 73 | 57 | 85 | 68.50 | |
| 71 | 54 | 65 | 89 | 53 | 65 | 66.17 | |
| 56 | 50 | 48 | 45 | 54 | 43 | 49.33 | |
| 87 | 73 | 89 | 88 | 88 | 100 | 87.50 | |
| 82 | 62 | 75 | 80 | 64 | 73 | 72.67 | |
| 81 | 71 | 69 | 84 | 71 | 91 | 77.83 | |
| 70 | 62 | 67 | 69 | 54 | 84 | 67.67 | |
| 83 | 65 | 82 | 80 | 66 | 86 | 77.00 | |
| 70 | 69 | 80 | 73 | 68 | 73 | 72.17 | |
| 85 | 70 | 76 | 76 | 68 | 90 | 77.50 | |
| 64 | 51 | 64 | 54 | 43 | 54 | 55.00 | |
| 54 | 61 | 62 | 62 | 52 | 71 | 60.33 | |
| 50 | 52 | 49 | 57 | 45 | 42 | 49.17 | |
| 71 | 61 | 73 | 83 | 51 | 84 | 70.50 | |
| 84 | 58 | 67 | 74 | 74 | 92 | 74.83 | |
| 69 | 55 | 70 | 69 | 52 | 75 | 65.00 | |
| 72 | 65 | 66 | 69 | 66 | 67 | 67.50 | |
| 75 | 59 | 65 | 66 | 48 | 91 | 67.33 | |
| 69 | 57 | 51 | 65 | 45 | 57 | 57.33 | |
| 69 | 61 | 65 | 70 | 56 | 96 | 69.50 | |
| 53 | 44 | 50 | 51 | 49 | 47 | 49.00 | |
| 69 | 55 | 52 | 82 | 56 | 75 | 64.83 | |
| 66 | 53 | 53 | 53 | 58 | 55 | 56.33 | |
| 65 | 70 | 56 | 68 | 70 | 60 | 64.83 | |
| 67 | 70 | 52 | 71 | 75 | 58 | 65.50 | |
| 77 | 59 | 50 | 51 | 60 | 62 | 59.83 | |
| 61 | 52 | 50 | 74 | 73 | 58 | 61.33 | |
| 59 | 55 | 53 | 67 | 71 | 58 | 60.50 | |
| 76 | 60 | 65 | 70 | 72 | 59 | 67.00 | |
| 56 | 63 | 52 | 68 | 77 | 59 | 62.50 | |
| 65 | 51 | 54 | 61 | 50 | 63 | 57.33 | |
| 53 | 57 | 57 | 50 | 66 | 62 | 57.50 | |
| 50 | 60 | 55 | 50 | 60 | 60 | 55.83 | |
| 65 | 58 | 58 | 50 | 59 | 53 | 57.17 | |
| 84 | 70 | 58 | 60 | 64 | 67 | 67.17 | |
| 68 | 57 | 56 | 55 | 64 | 68 | 61.33 | |
| 60 | 64 | 70 | 77 | 55 | 50 | 62.67 | |
| 72 | 61 | 60 | 78 | 66 | 55 | 65.33 | |
| 61 | 62 | 62 | 75 | 55 | 72 | 64.50 | |
| 68 | 60 | 58 | 70 | 68 | 73 | 66.17 | |
| 60 | 55 | 59 | 50 | 59 | 52 | 55.83 | |
| 61 | 65 | 58 | 50 | 60 | 55 | 58.17 | |
| 60 | 57 | 50 | 61 | 56 | 63 | 57.83 | |
| 66 | 58 | 57 | 53 | 75 | 50 | 59.83 | |
| 62 | 57 | 68 | 65 | 72 | 80 | 67.33 | |
| 60 | 60 | 63 | 50 | 81 | 55 | 61.50 | |
| 69 | 56 | 60 | 53 | 58 | 62 | 59.67 | |
| 62 | 50 | 60 | 55 | 58 | 65 | 58.33 | |
| 61 | 60 | 50 | 50 | 67 | 73 | 60.17 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 60 | 58 | 52 | 60 | 70 | 81 | 63.50 |
| 1 | 78 | 62 | 54 | 76 | 60 | 90 | 70.00 |
| 1 | 72 | 68 | 66 | 72 | 56 | 50 | 64.00 |
| 1 | 61 | 58 | 70 | 70 | 63 | 60 | 63.67 |
| 1 | 71 | 50 | 74 | 70 | 77 | 80 | 70.33 |
| 1 | 66 | 51 | 77 | 56 | 74 | 77 | 66.83 |
| 1 | 86 | 63 | 60 | 65 | 74 | 58 | 67.67 |
| 1 | 40 | 45 | 49 | 49 | 45 | 48 | 46.00 |
| 1 | 42 | 40 | 48 | 45 | 46 | 49 | 45.00 |
| 1 | 41 | 40 | 48 | 46 | 45 | 47 | 44.50 |
| 1 | 42 | 41 | 49 | 45 | 47 | 48 | 45.33 |
| 1 | 42 | 42 | 47 | 45 | 48 | 47 | 45.17 |
| 1 | 41 | 43 | 46 | 46 | 47 | 46 | 44.83 |
| 1 | 40 | 47 | 46 | 47 | 48 | 47 | 45.83 |
| 1 | 43 | 43 | 48 | 48 | 49 | 45 | 46.00 |
| 1 | 45 | 42 | 49 | 47 | 48 | 45 | 46.00 |
| 1 | 40 | 43 | 48 | 48 | 49 | 44 | 45.33 |
| 1 | 74 | 75 | 52 | 73 | 77 | 76 | 71.17 |
| 1 | 80 | 69 | 79 | 61 | 72 | 55 | 69.33 |
| 1 | 91 | 84 | 93 | 89 | 92 | 73 | 87.00 |
| 1 | 94 | 86 | 96 | 78 | 98 | 76 | 88.00 |
| 1 | 84 | 74 | 89 | 85 | 76 | 60 | 78.00 |
| 1 | 72 | 74 | 83 | 86 | 77 | 57 | 74.83 |
| 1 | 72 | 61 | 81 | 72 | 71 | 60 | 69.50 |
| 1 | 75 | 61 | 65 | 65 | 79 | 54 | 66.50 |
| 1 | 81 | 61 | 87 | 78 | 78 | 50 | 72.50 |
| 1 | 72 | 62 | 69 | 65 | 76 | 43 | 64.50 |
| 1 | 69 | 69 | 65 | 74 | 78 | 74 | 71.50 |
| 1 | 72 | 67 | 83 | 85 | 85 | 72 | 77.33 |
| 1 | 92 | 84 | 95 | 92 | 87 | 60 | 85.00 |
| 1 | 92 | 67 | 78 | 72 | 78 | 73 | 76.67 |
| 1 | 88 | 69 | 91 | 88 | 90 | 64 | 81.67 |
| 1 | 94 | 85 | 94 | 92 | 94 | 79 | 89.67 |
| 1 | 85 | 61 | 78 | 78 | 68 | 60 | 71.67 |
| 1 | 76 | 71 | 81 | 71 | 67 | 76 | 73.67 |
| 1 | 87 | 75 | 78 | 81 | 79 | 70 | 78.33 |
| 1 | 76 | 87 | 81 | 68 | 98 | 64 | 79.00 |
| 1 | 80 | 76 | 73 | 76 | 70 | 64 | 73.17 |
| 1 | 78 | 58 | 56 | 81 | 76 | 74 | 70.50 |
| 1 | 87 | 89 | 88 | 75 | 86 | 70 | 82.50 |
| 1 | 84 | 86 | 81 | 95 | 92 | 38 | 79.33 |
| 1 | 75 | 71 | 70 | 75 | 72 | 43 | 67.67 |

# Appendix G

**Addis Ababa University**
**School of Graduate Studies**
**Department of Science and mathematics Education**

## Standards for Health- Related Fitness Zone

I= needs Improvement Zone (does not meet health- related standard)

F= Healthy Fitness Zone (meets health- related standard)

H= High fitness performance Zone (exceeds healthy- related standard)

**Boys**

| **A** | **One-Mile Run** | | | **Sit- and-rea** | | | **90° push-u** | | | **Cull-up** | | | **Body mass index** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Zone | | | Zone | | | Zone | | | Zone | | | Lower end of HI | Upper end of HF |
| | I | F | H | I | F | H | I | F | H | I | F | H | | |
| **8** | >12: | 12:30-10: | <10: | 0-7 | 8 | | 0-4 | 5-13 | >1 | 0- | 6-2 | >1 | 20 | 15.1 |
| **9** | >12: | 12:00-9:3 | <9:3 | 0-7 | 8 | | 0-5 | 6-15 | >1 | 0- | 9-2 | >1 | 20 | 13.7 |
| **1** | >11: | 11:30-9:0 | <9:0 | 0-7 | 8 | | 0-6 | 7-20 | >2 | 0- | 12- | >1 | 21 | 14.0 |
| **1** | >11: | 11:00-8:3 | <8:3 | 0-7 | 8 | | 0-7 | 8-20 | >2 | 0- | 15- | >1 | 21 | 14.3 |
| **1** | >10: | 10:30-8:0 | <8:0 | 0-7 | 8 | | 0-9 | 10-2 | >2 | 0- | 18- | >1 | 22 | 14.6 |
| **1** | >10: | 10:00-7:3 | <7:3 | 0-7 | 8 | | 0-1 | 12-2 | >2 | 0- | 21- | >1 | 23 | 15.1 |
| **1** | >9:0 | 9:30-7:00 | <7:0 | 0-7 | 8 | | 0-1 | 14-3 | >3 | 0- | 24- | >1 | 24.5 | 15.6 |
| **1** | >9:0 | 9:00-7:00 | <7:0 | 0-7 | 8 | | 0-1 | 16-3 | >3 | 0- | 24- | >1 | 25 | 16.2 |
| **1** | >8:3 | 8:30-7:00 | <7:0 | 0-7 | 8 | | 0-1 | 18-3 | >3 | 0- | 24- | >1 | 26.5 | 16.6 |
| **1** | >8:3 | 8:30-7:00 | <7:0 | 0-7 | 8 | | 0-1 | 18-3 | >3 | 0- | 24- | >1 | 27 | 17.3 |
| **1** | >8:3 | 8:30-7:00 | <7:0 | 0-7 | 8 | | 0-1 | 18-3 | >3 | 0- | 24- | >1 | 27.8 | 17.8 |

## Girls

| Age | One-Mile Run | | | Sit- and-reac | | | 90° push-ups | | | Cull-up | | | Body mass index | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Zone | | | Zone | | | Zone | | | Zone | | | Lower end of HFZ | Upper end of HFZ |
| | I | F | H | I | F | H | I | F | H | I | F | H | | |
| **8** | >12:30 | 12:30-10:00 | <10:00 | 0-8 | 9 | | 0-4 | 5-13 | >13 | 0-5 | 6-20 | >20 | 22 | 16.2 |
| **9** | >12:00 | 12:00-9:30 | <9:30 | 0-8 | 9 | | 0-5 | 6-15 | >15 | 0-8 | 9-22 | >22 | 23 | 13.5 |
| **10** | >12:00 | 12:30-9:30 | <9:30 | 0-8 | 9 | | 0-6 | 7-15 | >15 | 0-11 | 12-2( | >26 | 23.5 | 13.7 |
| **11** | >12:00 | 12:00-9:00 | <9:00 | 0-9 | 10 | | 0-6 | 7-15 | >15 | 0-14 | 15-2( | >29 | 24 | 14.0 |
| **12** | >12:00 | 12:00-9:00 | <9:00 | 0-9 | 10 | | 0-6 | 7-15 | >15 | 0-17 | 18-3( | >32 | 24.5 | 14.5 |
| **13** | >11:30 | 11:30-9:00 | <9:00 | 0-9 | 10 | | 0-6 | 7-15 | >15 | 0-17 | 18-3( | >32 | 24.5 | 14.9 |
| **14** | >11:30 | 11:00-8:30 | <8:30 | 0-9 | 10 | | 0-6 | 7-15 | >15 | 0-17 | 18-3( | >32 | 25 | 15.4 |
| **15** | >10:30 | 10:30-8:30 | <8:00 | 0-11 | 12 | | 0-6 | 7-15 | >15 | 0-17 | 18-3( | >35 | 25 | 16.0 |
| **16** | >10:00 | 10:00-8:00 | <8:00 | 0-11 | 12 | | 0-6 | 7-15 | >15 | 0-17 | 18-3( | >35 | 25 | 16.4 |
| **17** | >10:00 | 10:00-8:00 | <8:00 | 0-11 | 12 | | 0-6 | 7-15 | >15 | 0-17 | 18-3( | >35 | 26 | 16.8 |
| **17+** | >10:00 | 10:00-8:00 | <8:00 | 0-11 | 12 | | 0-6 | 7-15 | >15 | 0-17 | 18-3( | >35 | 27.3 | 17.2 |