# EFFECTS OF AEROBIC EXERCISE ON SELECTED HEALTH RELATED PHYSICAL FITNESS COMPONENTS IN THE CASE OF AMBASEL WEREDA WUCHALE 17 GENERAL SECONDARY AND PREPARATORY SCHOOL; SOUTH WOLLO ZONE, AMHARA REGIONAL STATE

**M.Ed. THESIS**

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**HARAMAYA UNIVERSITY, ETHIOPIA**

# Effects of Aerobic Exercise on Selected Health related Physical Fitness Components in the case of Ambassel Woreda Wuchale 17 General Secondary and Preparatory School; South Wollo Zone, Amhara Regional State

**A Thesis Submitted to the Department of Sport Science**

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## POSTGRADUATE PROGRAM DIRECTORATE

As a research advisors we hereby certify that we have read and evaluated this thesis entitled **"Effects of Aerobic Exercise on Selected Health related Physical Fitness Components in the case of Ambassel Woreda Wuchale17 General Secondary and Preparatory School; South Wollo Zone, Amhara Regional State."** prepared by Gashaw Birhanu Yehuala . We recommend that it can be submitted as fulfilling the thesis requirements.

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As a member of the Board of Examiners of M.Ed. Thesis Open Defenses Examination, we certify that we have read and evaluated the thesis work prepared by Gashaw Birhanu Yehuala and examined the candidate. We recommend that the thesis be accepted as fulfilling the thesis requirements for the Degree of Master of Education in Teaching Physical Education.

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# DEDICATION

I dedicate this thesis manuscript to my beloved parents. Further to my teachers who thought and show the secret of wisdom particularly in elementary schools. Generally, to all kind of peoples who contribute even a piece of advice throughout in my life to reach in this stage**.**

## STATEMENT OF THE AUTHOR

First I declare that this thesis is my work and all sources of materials used in this thesis have been duly acknowledged. I declare this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or publication.

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# BIOGRAPHICAL SKETCH

The Author was born on December 16, 1981 E.C in Northern part of Wollo Amhara Regional State specific place Raya Kobo. He attended his primary and junior school at Kobo catholic primary school and he attended secondary school at Kobo high school and preparatory school attended in Woldiya higher preparatory school. After successfully passing Ethiopian school living certificate examination he joined Adama University, academy of Health and Physical Education in 2000 E.C and graduated with Bachelor of Education Degree in Health and Physical Education (B.Ed.) in 2002 E.C.

Up on completion, he was employed as a health and physical education teacher in south Wollo different secondary and preparatory schools ( Shikef, Akesta, Marye,Wuchale17) respectively . After five years of service, he joined Haramaya University, Department of Sport Science for perusing his MEd in Teaching Physical Education in 2007 E.C.

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# ABBREVIATIONS AND ACRONIUM

| | |
|---|---|
| **ACSM** | American College of Sport Medicine |
| **CG** | Control Group |
| **CVE** | Cardiovascular Endurance |
| **DT** | During Training |
| **EG** | Experimental Group |
| **HR max** | Maximum Heart Rate |
| **HRPF** | Health Related Physical Fitness |
| **ME** | Muscular Endurance |
| **PACER** | Progressive Aerobic Cardiovascular Endurance Run |
| **PE** | Physical Education |
| **PoT** | Post Test |
| **PT** | Pre Test |
| **SPSS** | Statistical Package for Social Sciences |

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**EFFECTS OF AEROBIC EXERCISE ON SELECTED HEALTH RELATED PHYSICAL FITNESS COMPONENTS IN THE CASE OF AMBASEL WEREDA WUCHALE 17 GENERAL SECONDARY AND PREPARATORY SCHOOL; SOUTH WOLLO ZONE, AMHARA REGIONAL STATE**


## ABSTRACT

*The main purpose of this study was to investigate the effect of 12 week aerobic exercise on selected health related physical fitness components. The study design was Experimental method. Simple random sampling technique were used to select subjects as well as to assign subjects for control group (EG) and experimental group (CG) while purposive sampling were used to select the sample sex and the study place, the data were analyzed 60 male sample was taken from a population of 71 male students by Slovins formula, the selected subjects were divided into 2 equal groups (n=30) CG and (n=30) EG was implemented. Their age range was from 18-22 years. EG who performed in 3 days/week for 3-month aerobic exercise training program like as walking, jogging, running and rope skipping and a CG did not perform this selected aerobic training unless both groups undergone normal physical education class program. Both groups had taken pre, during and post-testing. PT of two groups of 30 subjects(ME was measured by $90^0$angle push up test, CVE was measured using 12 minute run test, and flexibility was measured using sit and reach test) were recorded. After six weeks of aerobic exercise training, DT was taken in each parameter and a little improvement in each test results was observed and training was continually given by increasing its duration. After three months, posttest measurement on the same parameters was taken. The difference between the tests were analyzed statistically, with paired sample "t" test at the level of significance was $P<0.05$ to determine the difference between initial and final mean for participant. According to analyzed data the mean difference value After 12 week's aerobic exercise boosted in pushup performance by 1.76, in 12meter run 638mean difference was recorded, and in sit and reach test 0.53increments were observed throughout the study period. The result obtained in this study indicated that there were significant improvement in ME, CVE, and flexibility. Based on this finding, it can be concluded that Moderate aerobic exercise has positive effect on improvement of selected health related physical fitness components of male students.*



**Keywords** - Aerobic exercise, health related, physical fitness.

# 1. INTRODUCTION

This chapter presents the background of the study, statement of the problem, scope of the study, significance of the study, general and specific objectives of the study**.**

## 1.1. Background of the Study

Practically, to remain a nation strong physically, mentally, spiritually and socially, there must be education that takes place largely through the formal process of physical education in schools. (Buchres, 1975) Physical education has long and established tradition in schools, being linked to the development of both body and mind. In other words, it is an important component of the overall school program and integral part of the educational program. However, physical education uses physical activity to produce holistic improvements in persons' physical, mental social & emotional qualities. Physical activity has significant physical health benefits; and it appears to improve health-related quality of life by enhancing psychological well-being and by improving physical functioning in persons compromised by poor health. (USDHHS, 1996) and it is positively associated with health related quality of life (Berger &Motl, 2001).

However, physical education provides students with many opportunities to improve their overall life style; first and foremost, it provides students the opportunity to improve their physical fitness, development and health (Brubaker, 2011). There are many factors which help to develop physical fitness, but regular physical activity is the key aspect to achieve optimal physical fitness. It is a multidimensional state of being that usually refers to two aims: performance, which consists of skill-related fitness components, and health that includes five health-related fitness components, each of which contributes to total quality of life (Corbin& et al., 2006). Fitness is the first and foremost thing to enjoy the life fully (Reddy, 2012).

Fitness is the ability of a person to live a full and balanced existence and it is considered as one of the most important health markers in childhood (Ortega *etal.,* 2008). also has long been recognized as one of the primary objectives of physical education and

sport.(Wuest& Bucher, 1995).Further, physical fitness is a set of physical attributes that allows the body to respond or adapt to the demands and stress of physical effort.

That is, to perform moderate to vigorous levels of physical activity without becoming evenly tired. (Insel& Roth, 2002) and also it is a set of attributes that people have or achieve that relates to the ability to perform physical activity. And most widely used definitions the degree to which you are able to function effectively and efficiently in your daily life (EPEG9STB, 2005).Physical activity is any bodily movement produced by skeletal muscles that result in energy expenditure. Exercise is a sub category of physical activity; it is planned, structured, repetitive and purposive in the sense that an improvement or maintenance of physical fitness is an objective (Hahn &*etal.*n.d 2003).

There are two major types of exercises that help to improve physical fitness. Aerobic and anaerobic; aerobic exercise that involves continuous physical activity lasting for at least 10 minutes were as anaerobic exercise is intense physical activity that lasts only a few seconds to a few minutes Physical fitness is a positive quality of life, extending on a scale from death to "abundant life".

Generally, Fitness is defined as the ability of a person to live a happy, well-balanced life. It embraces the physical, intellectual, social and spiritual aspects of a person's life. Fitness has health-related components which include; aerobic fitness, muscular strength, muscular endurance, flexibility and body composition (Olaitan, 2005). And Skill –related components include agility, balance, coordinate, speed, power and reaction time (Wilmore &Costill, 2002).However proper exercise program, nutrition, adequate rest, good health habits etc. are influencing factors for achieving, maintaining, and improving a considerable level of HRPF. Among the influencing factors the aim of the study want to evaluate the effect of aerobic training on health related physical fitness.

## 1.2. Statement of the Problem

The unique role that quality physical education programs play is to teach the importance of health-related fitness, as well as to develop physical competence and cognitive understanding about physical activity for all students so that they can adopt healthy and

physically active lifestyle. (National Association for Sport and Physical Education, 2010).

Physical activity provides in developing health related physical fitness. Garzón (2009) defined health related physical fitness is the ability of a person to perform daily activities with vigor, and by traits and capacities that are associated with a low risk for the development of chronic diseases and premature death. Hippocrates said that, if all parts of the body are used in moderation it develops and ages slowly. But if left unused, it becomes defective quickly. Therefore, Physical activity is an important ingredient in the quality of life (Singh, 2014) and it is widely acknowledged to children's growth and development (Singapore Ministry of Education, 2005).

Many studies believe that regular physical activity can have immediate health benefits by positively affecting cardio respiratory, musculoskeletal, body composition and flexibility improvement. However the opportunities offered in secondary schools has been decreased in providing physical fitness lessons (Pangrazi&Darst, 2002). In Ethiopian secondary schools physical education curriculum developed one credit hour per week (42 minutes) for classroom as well as practical sessions similarly, in wuchale17 general secondary and preparatory school the given credit for PE class is limited. This is too little to improve the physical fitness components required to meet in the grade level with regard to set norms and standards of physical fitness at different age and sex levels.

According to American College of Sports Medicine (2009) participation in at least 30 minutes of moderate physical activity which may consists of aerobics and anaerobic thrice per a week will yield significant health benefits. And among those physical activates. Aerobic exercises are one of important physical activities which improve fitness qualities. And it is supported by (Yildirim, 2012) that aerobic exercise which consists of walking, jogging, rope skipping and distance running helps to improve physical fitness. Due to this reason the investigator tries to testify the effect of three months of aerobic exercise which is given thrice per a week on some selected health related fitness variables such as muscular endurance cardio vascular endurance, , and flexibility.

Based on the above reason the investigator tried to test the following hypothesis:

1. **$H_O$:** Aerobic exercise training has no effect on muscular endurance, of grade 12 male students.
   **$H_A$:** Aerobic exercise training has an effect on muscular endurance, of grade 12 male students.

2. **$H_O$:** Aerobic exercise training has no effect on cardiovascular endurance, of grade 12 male students.
   **$H_A$:** Aerobic exercise training has an effect on cardiovascular endurance, of grade 12 male students.

3. **$H_O$:** Aerobic exercise training has no effect on flexibility, of grade 12 male students.
   **$H_A$:** Aerobic exercise training has an effect on flexibility, of grade 12 male students.

### 1.3. Scope of the study

The study was conducted in Wuchale17 General Secondary and Preparatory School that is limited only on some selected grade 12 male students. The investigator focused only male students that they are available as sources of data, so easily compared to girl students and disregarded female students since their participation in physical exercise is too little. The other reason why the investigator wanted to engage into grade 12 is that physical education curriculum fitness test measurements are described in grade twelve PE subjects in chapter two pages 12-25, and he also uses to teach at this grade level.

Based on the above reason this single study were limited on Wuchale 17 Preparatory School grade 12 male students.

### 1.4 Significance of the study

The main aim of this study was to analyze the effect of aerobic exercise training on selected health related physical fitness components of grade 12 students at wuchale17 general secondary and preparatory school. In addition to this the study will intend to signify the following importance:-

1. It helps to identify the effects of aerobic exercise on muscular endurance
2. It helps to measure the effects of aerobic exercise on cardiovascular endurance

3. It helps to evaluate the effects of aerobic exercise on flexibility
4. It helps to motivate, encourage, and aware students to engage in aerobic exercise training program
5. It Serve as a spring board for other researchers who might want to follow further study in similar area since it gives information.

## 1.5. Objectives of the Study

### 1.5.1. General Objective

The general objective of the study was to investigate the effects of aerobic exercise on selected health related physical fitness components of grade 12 students in the case of South Wollo, Ambasel Woreda Wuchale 17 General Secondary and Preparatory School.

### 1.5.2. Specific Objectives

1. To measure the effects of aerobic exercise on muscular endurance
2. To evaluate the effects of aerobic exercise on cardiovascular endurance based on pre and posttest result.
3. To examine the significance of aerobic exercise on flexibility.

# 2. RELATED LITERATURE REVIEW

Related literature review is basic frame work of the study in order to create connected from the past findings that serve as ladder for the present investigation. Different theories, scholar articles component of the chapter brief review of the literature related to the major topic was described. these are the concept of physical Exercise and their types ,aerobic exercise and its benefits, the concepts of physical fitness and contributions of physical education to physical fitness, components of health related physical fitness and its contribution to health, factors influencing fitness will be discussed.

## 2.1 What is physical exercise?

Physical exercises any bodily activity that enhances or maintains physical fitness and overall health and wellness. It is performed for various reasons, including increasing growth and development, preventing aging, strengthening muscles and the system, it is good for health .in addition, improving your endurance, strength, balance and flexibility .(exercise & physical activity NIH national institute on aging January 2009).

Physical activity appears in general to have a positive effect on several health outcomes it has long been acknowledged as an important part of a healthy life style, and recent scientific evidence has linked regular physical exercise to a wide range of physical health benefits (Tall, 2002).

## 2.2. Types of physical Exercise

Physical exercises are generally grouped into two types, depending on the overall effect they have on the human body which is aerobic exercise and anaerobic exercise. An active vigorous workout can be aerobics or anaerobic. To simplify, aerobic means ‘with oxygen’ while anaerobic means ‘without oxygen. (Corbett, 2009).

### 2.2.1. Aerobic Exercise

Aerobic exercise refers to activities such as walking or jogging with continuous, repetitive movement of large muscle groups for at least 10 minutes at a time. (Stewart,2004). Aerobic

exercise consists of rhythmic, repeated, and continuous movements of the same large muscle groups for at least 10 minute at a time. Examples include walking, bicycling, jogging, continuous swimming, water aerobics, and many sports. When performed at sufficient intensity and frequency, this types of exercise increases cardio respiratory fitness. (Ronald et al., 2004).Aerobic exercise is a physical exercise of relatively low intensity that depends primarily on the aerobic energy-generating process. Aerobic means "with oxygen", and refers to the use of oxygen to adequately meet energy demands during exercise via aerobic metabolism. Generally light to moderate intensity activities that are sufficiently supported by aerobic metabolism can be performed for extended periods of time. and it refers to exercise that requires the consumption of substantially more oxygen than at rest and Aerobic exercise is any physical activity that uses large muscle groups and causes the body to use more oxygen than it would while resting. The goal of aerobic exercise is to increase cardiovascular endurance Examples of aerobic exercise include cycling, swimming, brisk walking, skipping rope, rowing, hiking, playing tennis, continuous training, and long slow distance training.(New England Wellness Web by @dventures OnlineAugust 18, 2008).

Aerobic exercise, which uses oxygen to keep large muscle groups moving continuously at intensity that can be maintain for at least 20 minutes. It uses several major muscle groups throughout the body, resulting in greater demands on the cardiovascular and respiratory systems to supply oxygen to the working muscles. Aerobic exercises include walking (at a speed less than 8 minutes per mile), which requires little in the way of equipment and can be performed by people of all ages, jogging/running (speed between 8 to 12 minutes per mile), jumping rope etc. (Microsoft Encarta encyclopedia deluxe 2003).

#### 2.2.1.1. Running

Running is one of the best cardiovascular exercises known to man. It requires no equipment (save a good pair of running shoes), is suitable for all fitness levels, and greatly improves overall health fitness and strengthens the heart, as well as the body.(Sunny, 2012) Studies have shown the health benefits of running to be tremendous, reducing chances of everything from the common cold to cancer. It is among the best aerobic exercises for physical conditioning of heart

and lungs. It helps ensure the efficient flow of blood and oxygen throughout the body, things that are proven to help to decrease the risk of a heart attack. (Willardson.,et al).

#### 2.2.1.2. Jogging

Jogging or running is a popular form of physical activity. Both running and jogging are forms of aerobic exercise. The difference between running and jogging is intensity. Running is faster, uses more kilojoules and demands more effort from the heart, lungs and muscles than jogging. Running requires a higher level of overall fitness than jogging.(www.betterhealth.vic.gov.au/running_and_jogging/pdf/).

#### 2.2.1.3. Walking

Although nearly all studies indicate that jogging provides slightly more musculoskeletal and aerobic benefits, walking has gained much ground in the last 10 years as a viable exercise to strengthen bones, tone muscles, and enhance heart performance. (MHNet, 2015)

#### 2.2.1.4. Rope skipping

Rope skipping is a high impact activity that requires coordination, balance, and endurance. Jumping rope is an activity that can increase aerobic endurance, muscular endurance, speed, agility, explosiveness, and dynamic balance. Rope Jump can be an important part of fitness and sports training, providing key advantages in developing dynamic balance, speed, quickness, agility, coordination, concentration, and cardiorespiratory efficiency. (Lee, 2007)

### 2.2.2. Benefits of Aerobic Exercise

The benefits of aerobic exercise are numerous. They include systemic changes such as reduced cholesterol and blood pressure, improved muscular endurance, reduced body fat, increased metabolism it strengthen the heart and lungs, making them more efficient and durable, improving quality of life. Exercise not only extends your life, but also gives you more energy to live it to the fullest. Aerobic exercise improves the strength of your bones, ligaments and tendons, allows your body to use fats and sugars more efficiently, burns lots of calories and plays an important role in reducing the onset and symptoms of aging and illness. Aerobic exercise reduces your risk

of heart disease, vascular disease, diabetes, reduces stress and combats depression as it increases self-esteem and physical and wellness (Kathleen, 2006).

Aerobic exercise has positive effects on low back pain and encourages strength, flexibility, and muscular endurance. This outcome has also shown to promote levels of activity, leaving the subject feeling better both physically and mentally. (Privett, 2012)

The benefits of exercise are very well known to all. Scientists and researchers all over the word do not cease to repeat it at every opportunity. One study after other shows the beneficial effects of exercise to our mind and body it helps to:

- **Better cardiac function:** The heart gets more blood per beat. That means that the heart rate is reduced in times of relaxation and during the exercise.
- **Weight loss:** During exercise the body burns fat and as a result the total body fat is reduced.
- **Improving mental health:** Regular exercise releases the endorphins, the natural painkillers of the body, which among other things reduces stress, anxiety and depression.
- **Reducing diseases:** The extra weight is an aggravating factor in the emergence of: heart disease, high blood pressure, stroke, diabetes and certain types of cancer.
- **Increases body resistance:** Maybe during or immediately after exercise you feel tired, but in the long-term exercise increase the strength and the sense of well-being keeping fatigue away**.**
- **Improves muscle health:** Exercise encourages the development of microscopic blood vessels that provide sufficient quantities of oxygen in the muscles and keep away from the muscles metabolic wastes such as lactic acid. This process can reduce the discomfort felt by those suffering from chronic muscle pain and back pain.
- Increases the maximum consumption of oxygen by the body
- Improves cardiovascular and cardiovascular function
- Increasing the supply of blood to muscles and the ability to make better use of oxygen
- Lowers heart rate and blood pressure
- Reduces stress, improves mood with more energy, reduces risk of depression or anxiety
- Greater resistance to fatigue
- Helps us to sleep better (Alex Chris,2008 webmaster@www.manageyourlifenow.com)

Low-impact aerobic exercise such as, swimming is valuable for improving general health and fitness in people who have arthritis or other conditions that limit their ability to do weight-bearing exercise (Thomas *et al.,* 2008).

Aerobic activities should be used to develop cardio respiratory endurance. Basically aerobic activities are those in which a sufficient amount of oxygen is available to meet the body's demands. During the performance of elevated level for an extended period .this activity typically involve vigorous and repetitive whole body or large muscle and movements that sustained for an extended period. Popular aerobic activities including running, walking rowing, swimming cycling aerobic dancing, jogging, tread mill and somewhat continuous in nature the intensity of work load can be easily regulated by controlling the pace. ( Shemelis M, 2011).

### 2.3. Contribution of Physical Education to Physical Fitness

Today physical education programs are designed and intended to promote general health and overall fitness. The exact regime of education may vary among programs, but physical education remains critical in achieving an overall healthy society. The main purposes of physical education are the process of becoming peoples physically active for the rest of their lives. Physical education has long and established tradition in schools, being linked to the development of both body and mind. Further it is an important component of the overall school program and integral part of the educational program that contributes, primarily through physical activity experiences, to the total growth and development of all students (Pangrazi&Darstn.d, 2002).

Physical fitness has long been recognized as one of the primary objectives of physical education and sport. Today the development and promotion of health related fitness is a diversity of populations is an important outcome of many programs in our field. Health related fitness encompasses the development of cardio respiratory efficiency, flexibility, muscular strength and endurance and appropriate body composition. Scientific evidence of the health benefits of exercise continues to grow, maintenance of an adequate level of the health related components of physical fitness; cardio respiratory endurance, muscular strength and muscular endurance, body composition and flexibility can help reduce the risk of heart disease, hypertension, on-insulin

dependent diabetes, osteoporosis, obesity and certain mental health problems such as depression. (Wuest& Bucher, 1995).

### 2.4. The Concept of Physical Fitness

Physical fitness to the human body is what fine-tuning is to an engine. It enables us to perform up to our potential. Fitness can be described as a condition that helps us for better look, pleasant feel our best. It is the ability to perform daily tasks vigorously and alertly with energy left over for enjoying leisure time activity and meeting emergency demands. (Desta Enyew, 2012).

Physical fitness is characterized by the ability to perform occupational and recreational activities without becoming unduly fatigued and to have the capacity to handle unforeseen emergencies And also it is associated with a person´s ability to work effectively, enjoy leisure time, be healthy, resist hypo kinetic diseases or conditions, and meet emergency situations"(Corbin et al., 2006).

There are many factors which help to develop physical fitness, but regular physical activity is the key aspect to achieve optimal physical fitness. Generally, Fitness is defined as the ability of a person to live a happy, well-balanced life. It embraces the physical, intellectual, social and spiritual aspects of a person's life. Fitness has health-related components and skill related components which include; cardiovascular endurance, muscular strength, muscular endurance, flexibility and composition (Olaitan, 2005). Skill-related components include agility, balance, coordination, speed, power and reaction time (Wilmore, and Costill, 2002).

#### 2.4.1. Health Related Physical Fitness

Health-Related Physical Fitness is the portion of physical fitness directed toward the prevention of or rehabilitation from disease, the development of a high level of functional capacity for the necessary and discretionary tasks of life, and the maintenance or enhancement of physiological functions in biological systems that are not involved in performance but are influenced by habitual activity. Maintaining an appropriate level of health related fitness allows a person to Meet emerge ,Reduce the risk of disease and injury, Work efficiently, Participate and enjoy physical activity (sports, recreation, leisure);and Look one's physical best .(Polwman, 2011),and

also health related physical fitness are directly related to improvement of health.(Virginia Department of Education, 2006).

#### 2.4.1.1. Cardiovascular Endurance

Cardiovascular endurance, sometimes called cardio respiratory fitness, aerobic fitness, or aerobic capacity, is one of a health-related component of physical fitness that relates to ability of the circulatory and respiratory systems to supply oxygen during sustained physical activity (USDHHS, 1996).Cardiorespiratory endurance is considered a critically important component of health related fitness because the functioning of the heart and lungs is so essential to overall wellness.

CVE is one of the most important measures of overall health. A person's level of cardiovascular endurance helps predict probability of disease, quality of life, and ability to react to acute physical and mental stress. For healthy individuals, higher cardiovascular endurance also indicates an elevated level of physical fitness. (Corbett, 2009)

A person simply cannot live very long or very well without a healthy heart. Low levels of cardiorespiratory fitness are linked with heart disease. Cardio respiratory endurance is developed by activities that involve continuous rhythmic movements of large-muscle groups like those in the legs-for example, walking, jogging, cycling and aerobic dance. (Insel&Roth, 2002).A VO2 max test in the laboratory setting is considered to be the best measure of cardiovascular fitness. Commonly administered field tests include the One mile run/walk, the 12-minute run, the PACER run for children and various bicycle, step, and treadmill tests.

#### 2.4.1.2. Flexibility

It is the ability to move the joints through their full range of motion and stretching exercises can improve to normal (Insel&Roth, 2002). Flexibility is specific to each joint of the body, thus there is no general measurement of flexibility as there is for cardiovascular fitness. Flexibility is the degree to which body segments can move or be moved around a Joint. (Brown,1986).Flexibility is typically measured in the lab using measurement devices such as a goniometer, flex meter and in the field with test exercises such as the sit and reach, and the zipper test.

### 2.4.1.3. Muscular Endurance

Muscular endurance, which represents multiple muscle contractions or a sustained muscle contraction over a period of time, for example during running, climbing, swimming, jogging, running on tread mill at the gym there will be muscle contraction those muscle contraction can assists the improvements of muscular endurance. During aerobic exercise, minute ventilation increases and an increased load is placed on the respiratory muscles. Both the frequency and the speed of contraction in the muscle are increased, (Harms *et al.*, 2000).

It is a health-related component of physical fitness that relates to the muscle's ability to continue to perform without fatigue (USDHHS, 1996).and it is the ability to sustain a given level of muscle tension and to perform repeated movement with sub maximal loads for extended period of time i.e. to hold a muscle contraction for a long period of time, or to contact a muscle over and over again. Muscular endurance is important for good posture and for injury prevention and copes with the physical demands of ever day life and enhances performance in sports and work. Like muscular strength, muscular endurance developed by stressing the muscles with a greater load (weight) than they are used to (Insel&Roth,2002).For true assessment of muscular endurance it would be necessary to test each major muscle group of the body. Lab and field tests of muscular endurance are similar and are based on the number of repetitions that can be performed by the specific muscle group being tested (example: repetitions of push-ups or abdominal curls). Muscular endurance can be measured isometric ally (static contractions) or isotonic ally (dynamic contractions). (willardson, 2008)

### 2.4.1.4. Muscular Strength

Muscular **S**trength is a health-related component of physical fitness that relates to the ability of the muscle to exert force (USDHHS, 1996).and refers to the force or tension that can be generated by a muscle or muscle group during one maximal effort (Physiology of Exercise: Responses and Adaptations, 2nd edition).

It is the amount of force a muscle can produce with a single maximum effort. Strong, powerful muscles are important for the smooth and easy performance of everyday activities, such as carrying, lifting, boxes, and climbing stairs, as well as for emergency situations. They help keep

the skeleton in proper alignment, preventing back and leg pain and providing the support necessary for good posture and it can be developed by training with weights or by using the weight of the body for resistance during callisthenic exercises such as push-ups and sit-ups (Insel&Roth, 2002).

For true assessment it would be necessary to test each major muscle group of the body. Lab and field tests are similar and involve the assessment of one repetition maximum (the maximum amount of resistance you can overcome one time). 1RM tests are typically conducted on resistance machines. Strength can also be assessed using dynamometers. Strength can be measured isometric ally (static contractions) or isotonic ally (dynamic contractions).

**2.4.1.5. Body Composition**

It is a health-related component of physical fitness that relates to the relative amounts of muscle, fat, bone and other vital parts of the body. (USDHHS,1996). There are standards to determine the levels of body fat that individuals should possess. It is essential to maintain a minimal amount of body fat (percent body fat) for good health, but an excess level as well as a very low body fat level can cause serious health risk. The proper way to determine recommended weight is by finding out what percent of total body weight is fat and what amount is lean tissue. Body composition can be accessed through several techniques. The most common of these are: hydrostatic weighing or under water weighing, skinfold thickness, girth measurements and bioelectrical impedance. Because these procedures yield estimates of body fat, each technique may yield slightly different values. Therefore, when assessing body composition, the same technique should be used for pre and posttest comparisons (Hoeger&Hoeger, 1999).

BMI is calculated as body weight in kilograms divided by height in meters squared (kg/m2) or is an indicator of weight-for-height. It is considered as one of the most commonly anthropometric measures to assess total body adiposity, because of its simplicity as a measure and its global acceptance (Cornier &et al., 2011). BMI is probably a reasonable indicator of fatness in the general population. (Health related fitness measures for youth, 2012).

The components of physical fitness are specific and different, are also interrelated. Fit individuals have adequate levels of each of components of physical fitness (i.e. the health-related

components, skill-related components, metabolic fitness components and bone integrity), but unfit individuals can possess one component of physical fitness and do not possess the other components. For example, individuals who have good cardiovascular fitness do not necessarily have good strength, as well as individuals who possess good balance do not necessarily have good agility (Corbin &et al., 2006).

### 2.5. Contribution of Physical Fitness to Health

The health benefits of being physically active in adulthood are well known, the evidence suggests that being a physically active adult can help in both the prevention and treatment of many common but serious, health conditions such as high blood pressure, poor blood lipid profile, insulin resistance, obesity and sometimes of cancer (U.S. Department of Health and Human Services, 1996 cited in Winsley&Armstrong). Therefore, regular participation in physical activity has significant positive effects on people's health and wellbeing that increase strength and endurance, build healthy bones and muscles, control weight, improve blood pressure and cholesterol levels (Ayers &Sariscsany 2001).

The benefits of physical fitness are numerous it include better health, greater strength, more flexibility, increased energy, improved appearance, and a more positive attitude and Mood. Regular exercise can lead to both immediate and long-term benefits. Regular physical activity has been shown to reduce the morbidity and mortality from many chronic diseases**.** The benefits of fitness far outweigh the inconveniences of regular exercise. (http://www.health-galaxy.com/benefits-of-physical-fitness.html).

### 2.6. Factors Influencing Fitness

According to Sharkey, (1990) there are factors influence our fitness

#### 2.6.1. Heredity

We inherit many factors that contribute to aerobic fitness, including the maximal capacity of the respiratory and cardiovascular systems, a larger heart, more red blood cells and hemoglobin and a high percentage of slow oxidative and fast oxidative-glycolytic muscle fibers. Mitochondria,

the energy producing units of muscle and other cells, are inherited from the maternal side. Recent evidence indicates that the capacity of muscle to respond to training may also be inherited. Other inherited factors such as physique and body composition will also influence fitness and the potential to perform at a high level.

### 2.6.2. Training

Training improves the function and capacity of the respiratory and cardiovascular systems and boosts blood volume, but the most important changes takes place in the muscle fibers that are used in the training. Aerobic training improves muscles ability to produce energy aerobically and shifts metabolism from carbohydrate to fat, which may produce the single most important health effect of exercise. Burning fat reduces fat storage, blood fat levels, and cardiovascular risk. It also improves insulin sensitivity and reduces the risk of some cancers. Of course, training enhances the ability to perform, but the improvement is limited to the activity used in training.

### 2.6.3. Gender

Before puberty, boys and girls differ a little in aerobic fitness, but from then on girls fall behind. Young women average 15 to 25% less than young men in aerobic fitness, depending on their level of activity. But highly trained young female endurance athletes are but 10% below male endurance athletes of the same age in $vo_2$max and performance times.

## 2.7. Effect of Aerobic Exercise on Health Related Physical Fitness

There are many studies done on the effect of aerobic exercise training on health related physical fitness to name a few Vivek (2013) studied on the effect of aerobic exercise on physical fitness and body composition of school boys. It is concluded that Aerobic training contributes significantly for the promotion of abdominal strength, Speed, cardio-vascular endurance, body composition. Another study by Licy (2006) also studied on the effects of aerobic exercise intervention with goals of improving health-related physical fitness among selected adults. The results of analysis of variance with repeated measures of health-related physical fitness showed that the subjects in the exercise group had significantly more improvements in abdominal muscle strength and endurance than the subjects in the control group.

This study indicated that 12-week aerobic exercise program was effective in improving the abdominal muscle strength and endurance among selected adults.

Further Toy, (2008) also studied on the effect of aerobic dance training on Vo2 Max and Body Composition in early middle aged men. After twelve weeks of aerobic dance training, a significant reduction was noted in body weight, BMI and percentage body fat, and a significant in Vo2 max. This study highlights that systematic aerobic dance training helps to increase the physical and cardio respiratory fitness among middle aged adults. Promoth, (2010) also studied on the effect of step aerobics training on selected physical and physiological variables of physical education students. The subjects performed step aerobics apart from their regular physical education workout, five days in a week for a period of sixty minutes. The control groups did not participate any training program expect their regular workout. The data were computed statistically by using ANCOVA to see progressive effects. The result shows step aerobics had significant effects on selected physical and physiological variables improved significantly among the experimental group i.e., flexibility, explosive power, BMI, and Vo2 max and no significant changes were seen in control group.

Mahendran (2009) studied the effect of 12 weeks aerobic exercises on selected health related physical fitness and physiological variables among adolescents. Selected health related variables were, muscular strength measured using hand grip dynamometer, muscular endurance measured using bent knee sit ups, cardio-respiratory endurance measured using 12-minutes run/walk, flexibility measured with sit and reach box. Body mass index measured using height and body weight. The results of pre- test and post- test were compared by using Analysis of Covariance. All variables were significantly improved among experimental group.

Promoth,K.G,(2010)also studied on the effect of walking on body composition and cardiovascular function of middle aged men. Substantial improvement occurred in maximum oxygen consumption sub-maximal heart rate and resting diastolic blood pressure and reductions of body weight and percent of fat. Demir (2013) investigated the effects of eight-week step-aerobic exercise programs on flexibility, body weight, and body fat percentage and body circumference measurements of sedentary women. As a result of the step-aerobic exercises, they found that flexibility and all parameters related with the body composition of the individuals

were changed positively. Health Related Physical Fitness is the portion of physical fitness directed toward the prevention of or rehabilitation from disease, the development of a high level of functional capacity for the necessary and discretionary tasks of life, and the maintenance or enhancement of physiological functions in biological systems that are not involved in performance but are influenced by habitual activity. (Polwman, 2011 cited in Mathewos, 2013)

Shahana et al., (2010) investigated on the effect of a 12-week aerobic exercise program on health-related physical fitness components in middle-aged adults. The experimental group 30 subjects underwent aerobic exercise training thrice a week for 12 weeks. The control group 30 subjects did not attend any training program. The post-tests were conducted on both groups. They conclude that improved cardiorespiratory endurance, flexibility, muscular strength endurance and decreased skin fold thickness (body fat %) among the experimental group after 12 weeks. In the case of control group no significant changes were seen in any of the selected variables. Saygın & Ozturk, (2011) also investigated on the effects of 12 week aerobic exercise program on health related fitness components and blood lipids in obese girls. Participants joined sessions for 60 min per day, 3 days per week for 12-week. They concluded that regular aerobic exercise may affect health related fitness components.

Further, Chao-Chien, & Yi-Chun, (2012) examined the effect of jumping rope training on the health-related physical fitness in students with intellectual impairment. Their findings on jumping rope training demonstrated significant effects on cardiovascular endurance, flexibility, and muscular strength and endurance. No significant influence on the BMI of students with intellectual impairment. Bagavinar & Kamalakkannan, (2013) also examined the effect of aerobic training, aquatic training and combined training on selected physical fitness, variables among obese college men. The mean gains and losses made from pre and posttest were statistically significant showing that aerobic training, aquatic training and combined training produced significant improvement in flexibility, muscular endurance, cardio respiratory endurance, percent body fat, body mass index. Control group produced insignificant at $p<0.05$.

### 2.7.1. Effect of Aerobic Exercise on Muscular Endurance

Muscular endurance, which represents multiple muscle contractions or a sustained muscle contraction over a period of time, for example during running, climbing, swimming, jogging, running on tread mill at the gym there will be muscle contraction those muscle contraction can assists the improvements of muscular endurance. During aerobic exercise, minute ventilation increases and an increased load is placed on the respiratory muscles. Both the frequency and the speed of contraction in the muscle are increased, (Harms et al., 2000).

Chia-Lin Li (2005) evaluated on the effects of aerobic exercise intervention with goals of improving health-related physical fitness conducted as a quasi-experimental design. The study concluded that 12-week aerobic exercise program was effective in improving the abdominal muscle strength and endurance.

### 2.7.2. Effect of Aerobic Exercise on Cardiovascular/respiratory Fitness

A person's level of cardiovascular endurance helps predict probability of disease, quality of life, and ability to react to acute physical and mental stress. For healthy individuals, higher cardiovascular endurance also indicates an elevated level of physical fitness (Corbett, 2009). There are many studies which prove that cardiovascular endurance improved after aerobic exercise. Partavi, (2013) investigated on the effects of a 7 week of rope-jump training on speed, endurance and agility in middle school male students. The researcher concluded that 7 weeks rope jump training is a feasible and safe training method for improving cardiovascular endurance and agility in middle school student boys. Therefore, correctly performed aerobic exercise causes positive change in the body's cardio respiratory system. During maximum aerobic exercise the trained individual has increased maximum oxygen consumption and is better able to process oxygen and fuel can provide more energy to working muscle. (Probart et al., 1991)

### 2.7.3. Effect of Aerobic Exercise on Flexibility

Poor flexibility can directly affect cardiovascular endurance, muscle strength and muscular endurance. Physiologically flexibility can include extra-muscular (range of motion at a joint) and intramuscular factors such as hyper tonicity within the muscles themselves. Aerobic exercise and strengthening allows muscle to contract and flex. Those muscles also need to be starch to protect

them from injury and to improve range of motion in the joints. So, aerobic activities have its own contribution for flexibility and balance. A research of Nagaraj et al, (2011) studied effect of stretching exercises and aerobic exercises on flexibility of school boys. The results of pre-test and post-test using sit and reach box were compared with using Analysis of Covariance. The result shows that combined exercises (stretching and aerobics exercises) were significantly better than stretching exercises, aerobics exercises in flexibility. Thus flexibility can be more developed by aerobic and stretching exercising.

### 2.8. Health Related Physical Fitness Test

#### 2.8.1. Test for Muscular Endurance

**$90^0$angle push-up tests** are a test of upper body muscle strength and endurance. Strength and endurance of the muscles of the upper body are important in activities of daily living, maintaining functional health and promoting good posture. A number of assessments of upper arm and shoulder girdle strength/endurance have been used in various youth fitness batteries. The most commonly used assessment is the push up test. The 90° push-up was selected as the recommended test item in the CPFA3P because it has some very practical advantages over the pull-up. The most important advantages are that it requires no equipment and very few zero scores occur. The majority of children can successfully perform the 90° push-up assessment and have a more favorable experience. The right-angle, or $90^0$, push-up is recommended as a test of upper-body strength and endurance. The objective of the test is to complete as many $90^0$angle push-ups as possible at a specified pace (Connecticut state department of education, 2009).

$90^0$ angle push up test is one method that is often used in testing, measurement and evaluation of Physical Education and Sports Science to measure the strength and endurance of the shoulder. This test has also been proposed in FITNESSGRAM® physical fitness test battery to be used for measuring the strength and resilience of the muscles of the arm and shoulder (Cooper Institute for Aerobics Research, 2007 cited in Ahmad H. & Gunathevan, 2015)

#### 2.8.2. Test for Cardio Vascular Fitness

**Twelve minute run / walk test:** is a popular field test used for measuring aerobic fitness. This test is still one of the basic fitness tests used by the military, as well as many coaches, trainers and an individual to determine cardiovascular fitness and track fitness over time (Cited in Das,

2013). Twelve (12) minute run test is sometimes referred as cooper test which is designed by Dr. Kenneth Cooper. This is measuring the distance covered in 12(twelve) minutes. The test involves running or walking for twelve minutes around the marked out area and registered how far cover in that time. Required equipment includes stopwatch or wrist watch, marked out running area and data recording forms.

This test objective is to measure the CVE of the participants. For this test the participants will run for 12 minutes, and the total distance covered will be recorded. The participants can walk also, though the participants will encouraged to push's them as hard as they could).

### 2.8.3. Test for Flexibility

Flexibility of the joints, both in the upper and lower body, is an important component of health-related fitness. People benefit from increased flexibility on a daily basis, both in routine tasks and those associated with more rigorous physical activity (American College of Sports Medicine, 1995). Flexibility was measured by the sit-and-reach test (Clark et al., 1989). The sit and reach test is used to determine the joint range of motion and flexibility of the muscles around the hip joint (the test simultaneously examines the flexibility of the lower back and hamstrings). The reliability of the test has been documented previously (Johnson and Nelson, 1979 cited in Durandt, 2009).

After a warm-up, the participants sat on the floor with their legs straight out in front of them, heels touching the side of a box. Their fingertips were positioned on the 0 cm edge of the box that was marked in centimeters towards the opposite edge. They were then asked to bend forward with arms outstretched towards their toes. The farthest test score of the three trials were administrated and the mean value was taken in the analysis. The sit-and-reach test was conducted to measure flexibility of the hamstrings and lower back. The sit and reach measured the distance of the performed stretch to the nearest cm Equipment needed box and a ruler. Before the test, the shoes were removed and the subjects were instructed to slowly reach forward with their knees fully extended as far as possible with palms facing downward. This test represents flexibility in the lower back and upper thighs. The score is recorded to the nearest centimeter as the distance before (negative) or beyond (positive) the toes.(Willis,*et.al* 2012).

# 3. MATERIALS AND METHODS

Research methodology is the corner stone which guide our research. This section includes description and justification of chosen methodology and research methods which are implementing during study. Hence these common elements such as the study area, source of data, study design, sample and sampling techniques, inclusive and exclusive criteria, methods and procedures of data collection, method of data analysis on the effects of aerobic exercise on physical fitness of grade 12 students at Wechale17 General Secondary and Preparatory School will be presented respectively in separate section.

## 3.1. Description of the Study Area

This research were conducted at Wuchale town, capital of Ambasel woreda in South Wollo zone, Amhara regional state for three consecutive months, starting from October to December
2017/2018 and wuchale is placed which is located at a latitude and longitude of 11°30′N 39°36′E and an elevation of 1711m.Ambasel District is one of the 24 districts in South Wollo Zone, in Amhara Regional State, located at about 440km east of the capital of the Region, Bahir Dar, 60km south of Dessie which is the capital of south Wollo Zone and 461km from Addis Ababa. It is bounded in the West Tenta woreda, in the East Tehuledere woreda, in south Kutaber and in the north Habru woreda. (https://en.m.wikipedia.org>wiki>Wuch...).

The study was undertaken in wuchale town wuchale17 general higher, preparatory and secondary school found. The school located in kebele 1(one) east of the town, established in 1998 and giving 9-12 grade students in manner of two shifts (morning and afternoon) a total of 6 class schedule 42 minutes for one class. Map of the study area is indicated on page 67.

### 3.2. Experimental Materials

The following materials were used in this study, Measuring tapes, weight machines, exercise mats, marking cones, stopwatch, jumping ropes, record sheets, paper, pen and whistle were used during training as well as in the tests.

### 3.3. Source of Data

For this study primary data were used. The primary data were obtained from experimental variables according to designed parameters. And the secondary data was collected from various documents, journals, books, internet sources and unpublished booklets.

### 3.4. Treatment and study Design

Depending upon the nature and appropriateness of the pre, during and post-test data the research approach designed in this study was employed quasi experimental method, since it helps to measure, assess, evaluate and analyze the effect of aerobic exercise on selected health related physical fitness of grade 12 male students at Wuchale17 General Secondary and Preparatory school. As a result, In this study the investigator was applied aerobic Training programs planned for a period of 12 weeks and administered 3 days a week and for 40-60 min each day on EG. An exercise involving the use of large muscles groups that could be maintained continuously and aerobic in nature was included in the program. These exercises included walking, running, jogging, rope skipping, jumping, distance running, and stretching exercises. There is also practical class training program in the academic schedule of physical education at the school for the whole students one day per week. The exercise session consists of Warm - up period of 7-10 min., and is combined with stretching exercise and progressive aerobic activity mainly lesson related activities. However cool down period were kept for 3 to 7 min.

The study was carried out for three consecutive months for training aerobic exercise. In the beginning of the first month (October) pretest was taken and in half of the second

month (November) the second test was taken and also at the end of the 3rd month (December) post- test was also administered.

**Table1. The Study Design Layout**

| Treatment | Aerobic exercise program |
|---|---|
| Frequency | 3days/week |
| Total duration | 12 weeks |
| Duration /session | 40-60 minutes |
| Intensity | Moderate (60-75HRmax) |
| Exercise days | Monday, Wednesday and Friday |
| Time of training | Morning |

### 3.5. Study Sample

Participants of this study were grade 12 male students in the study area, who fulfilled the requirements for the study, age from 18-22 years old, free from any impairment or chronic disease, and volunteer in response to the desired study. The participants of this study have believed that they will develop physical fitness during working with the study.

### 3.6. Sample and Sampling Technique

Simple random sampling technique were used to select subjects as well as to assign as control and experimental groups, while purposive sampling were used to select the sample sex and the study place, the data were analyzed 60 male sample was taken from a total population of 71male students (n=30) CG and (n=30) EG was implemented. All of the students were given one practical physical education lesson per week but 30 of the EG members were given additional aerobic exercise training for three consecutive months. The sample size which was taken from total population for this study was calculated by Slovins formula.

$$n = \frac{N}{1 + Ne^2}$$

Where n= the sample size

N= the population size

e =the margin of error

$$n = \frac{71}{1+71(0.05)^2}$$

$$= \frac{71}{1+71(0.0025)}$$

$$= \frac{71}{1+0.1775}$$

$$= \frac{71}{1.1775} = 60.29 \approx 60$$

### 3.7. Inclusive and Exclusive Criteria

Individuals with cardiac conditions and taking medications were not being admitted to the study. In addition, the subjects who are having any recent physical injury and medical conditions restricted by physicians otherwise the subjects who have healthy, voluntary , free from bad habits, family's interest and they are from grade 12 were admitted.

### 3.8. Methods and Procedures of Data Collection

The researcher used quantitative data collection method to collect data from the subjects. by using pre-test, during and post-test through the appropriate health related physical fitness tests including measures, like12 minutes run/walk test for CVE, $90^o$angle push up test for muscular endurance, and sit and reach test for flexibility results were collected and recorded by the investigator with the help of assistant who took training for two days. Each test was held at a field of wuchale17 secondary and preparatory school.

### 3.9. Fitness Test Analysis

In order to evaluate the effects of aerobic exercise on selected health related physical fitness of grade 12 male students. The following fitness tests were recorded before, during and after 12

week aerobic exercise program and are selected in Ethiopian physical education grade 12 text books for physical fitness evaluation.

### 3.9.1. Ninety degree ($90^0$) angle pushes up

The purpose of this test is to evaluate the endurance of the arm and chest muscles. This test were proposed in FITNESSGRAM® physical fitness test battery to be used for measuring the endurance, strength and resilience of the muscles of the arm and shoulder (Cooper Institute for Aerobics Research, 2007). The directions is support the body in a push up position, and then lower the body until the arms bend $90^0$angles and the upper arm are parallel to the floor and do push-ups repeatedly by lowering the body until the arms bend $90^0$ the upper arms are parallel to the floor. The rhythm should be approximately one push up every three seconds and count the number of pushups able to perform.

### 3.9.2. Twelve Minute Run / Walk test

This test will be referred as cooper test which is designed by Dr. Kenneth cooper. The objective of the Cooper test is to measure the cardiovascular endurance of the students and predict students' VO2 max. This is measuring the distance covered in twelve minutes, involves running or walking for twelve minutes around 400 meter track marked out area and register how far cover in that time with the nearest 50 meter. Before starting this test the equipment's that used for the test such as stop watch, measuring tape and marking cones were arranged. The participants performed enough warming up and stretching exercise. On command "Go" the participants run/walk for 12 minutes. The total distance covered by the participants with in 12 minute was recorded in meter (m). Throughout the test the participants were encouraged to push themselves to run as hard as possible.

### 3.9.3. Sit and Reach Test

The purpose of this test was measure the flexion of trunk and the ability to stretch the lower back and thigh muscles (hamstrings).The direction is sit with legs fully extend and bottom of feet flat against box or steps about 20 cm high and extend (stretch) arms and hands forward as far as possible and hold for a count three. Then with a ruler (in mm or cm) the distance before or beyond the edge of the board that reach was measured. Distances before the edge (not able to

reach toes) were expressed as negative scores; those beyond the edge were expressed as positive scores. The participants performed warming up activities and some stretching activities for 5 minutes before starting test. For this test the participants removed their shoes and sit on the floor with legs stretched out straight ahead. The soles of the feet are placed flat against the sit and reach box. Both knees are locked and pressed flat to the floor, the tester assists by holding them down with the palms facing downwards, and the hands on top of each other or side by side, the subject reaches forward along the measuring line as far as possible. Three times trail will be permitted to the subject and the best one from three trials is taken as their score. The subjects reached out and hold that position for a one-two seconds while the distance is recorded.

### 3.10. Methods of Data Analysis

The data collected through fitness tests were analyzed, interpreted and tabulated in to a meaningful idea using manually and in computer in order to compare the selected health related physical fitness components changes which observed among participants that undergoing aerobic exercise program. The data was analyzed using computerized statistical package software (SPSS version 20). Paired sample t-test was used to compare the pre and post training data at level of significance is$< 0.05$.

### 3.11. Data Quality Control

To ensure data quality, all the field test procedures, collection of data's and handling information was carried out in accordance with standard protocols and measurements. And the investigator was use assistant to collect data. And in order to avoid error, training was given for assistant data collector on how to use data collecting instruments and measurements during data collection. And regarding to create awareness about each test the trainers get additional lectures beyond field practices and demonstrations. Only standardized materials were used to keep the quality of the data. Additionally all the above mentioned tests were recorded and fed in to the software twice with different persons to avoid errors in data feeding

### 3.12. Protocol and Ethical Consideration

This study went in line with ethical issues. The privacy of the participant could be protecting. Generally, this research has been conduct as pre rules, policies and research ethics of Haramaya University

# 4. RESULTS AND DISCUSSION

This chapter discussed the analysis of data collected from the samples of study and its results. The purpose of this study was to investigate the effect of three months of aerobic exercise on selected health related physical fitness components among participants of Ambasel woreda wuchale17 general secondary and preparatory school grade 12 students. In this study 60 male students as Subjects. They were divided randomly into two groups equal in number EG (n=30) and CG (n=30) their age was 18-22 years. Aerobic exercise was given for 12 consecutive weeks (three months -October, November, and December). The training included three days per week; with duration of 40-60 minutes and moderate intensity. Measuring tapes, weight machines, exercise mats, marking cones, stopwatch, jumping ropes, record sheets, paper, pen and whistle were used during training.

The variables selected for this study were health related physical fitness components such as Muscular endurance, cardiovascular endurance and flexibility. Pre, during and posttest were conducted for all the 60 subjects on some selected health related physical fitness components and the scores were recorded. Information of subject's participation in this research project was kept confidential. Records pertaining to this research were coded secretly in numbers and put in a secured storage area. The collected data were analyzed by t-test by using SPSS. The results for each fitness variables are discussed below.

## 4.1. Characteristics of study participants and physical fitness variables

**Table 2. Characteristics of the study participants**

| Group | N | Age | | Height | | Weight | |
|---|---|---|---|---|---|---|---|
| | | Mean | S.D | Mean | S.D | Mean | S.D |
| EG | 30 | 19.35 | .933 | 1.7310 | .0766 | 54.025 | 5.495 |
| CG | 30 | 19.80 | 1.105 | 1.719 | .0717 | 55.900 | 5.548 |

As shown from above Table 2 Descriptive characteristics of 60 study participants from wuchale17 preparatory school mean of age (EG=19.35, CG=19.80) height (EG=1.73, CG=1.72)

and weight (EG=54.03, CG= 55.9). Subjects were relatively had the same age, height and weight at the beginning of exercise.

**Table 3. Dependent variables and tests**

| No | Variables | Methods/Tests | Equipment | Unit of Measurement |
|---|---|---|---|---|
| **1** | ME | $90^0$angle push up test | Stopwatch, whistle | Repetitions per minute |
| **2** | CVE | Twelve minute run/walk test | Sport field, Stopwatch, Whistle and cones | Recorded to the nearest 50m/400m |
| **3** | Flexibility | Sit And Reach Test | 20 cm height sit and reach box, Measuring Tape | Recorded to the nearest 1milimeter |

As it can be seen in above table 3 illustrated that the types of variables, methods, test items and its measurement units which designed to do this experimental research. The results of selected physical fitness variables of experimental and control groups pre, during and post-test data were analyzed. Its results had showed under these tables.

**4.2. Effects of Aerobic Exercise on Muscular Endurance**

**Table 4. The mean value of ME ($90^0$angle push up test) for CG and EG**

| **Group** | **Test** | **PT**(X±SD) | **DT**(X±SD) | **PoT**(X±SD) | **∆X)PT and PoT** | **P** |
|---|---|---|---|---|---|---|
| **EG** | $90^0$ angle pushup test | 25.97±6.04 | 26.80±6.18 | 27.73±6.24 | 1.76 | .000 |
| **CG** | $90^0$ angle pushup test | 25.77±10.00 | 25.83±9.75 | 25.87±9.90 | 0.1 | .676 |

*ME=Muscular endurance EG= experimental groups, CG=control group X=mean value of each tests, SD= Standard deviation, ∆X= (MD) mean difference, PT=pretest result, DT= during training result, PoT= post test results, p=significance level.*

As shown from table 4 the average pretest score of EG (N=30) was found to be 25.97 with a standard deviation of 6.04 and CG (N=30) was found to be 25.77 with an SD of 10.00 from this data we can see that the scores in the pretest for both groups were close. After six weeks EG mean score was 26.80 with SD 6.18 and CG mean score of 25.83 with SD score 9.75. In contrast, the average post test score after 12 week aerobic exercise training of EG was found out 2s7.73 with SD of 6.24 and for CG mean 25.87 with SD of 9.90. From this data we can see that the scores in the posttest for both groups (EG and CG) were very different. One can pick up that these numbers in pretest and posttest mean scores (achievement levels) are different. Hence, these data indicated that there is a significant difference and gradual improvement between PT, DT and PoT test results of EG and there is deficient improvement between PT, DT and PoT test results of CG.

**Figure1. Graphical presentation of $90^0$ angle push up test results of EG and CG**

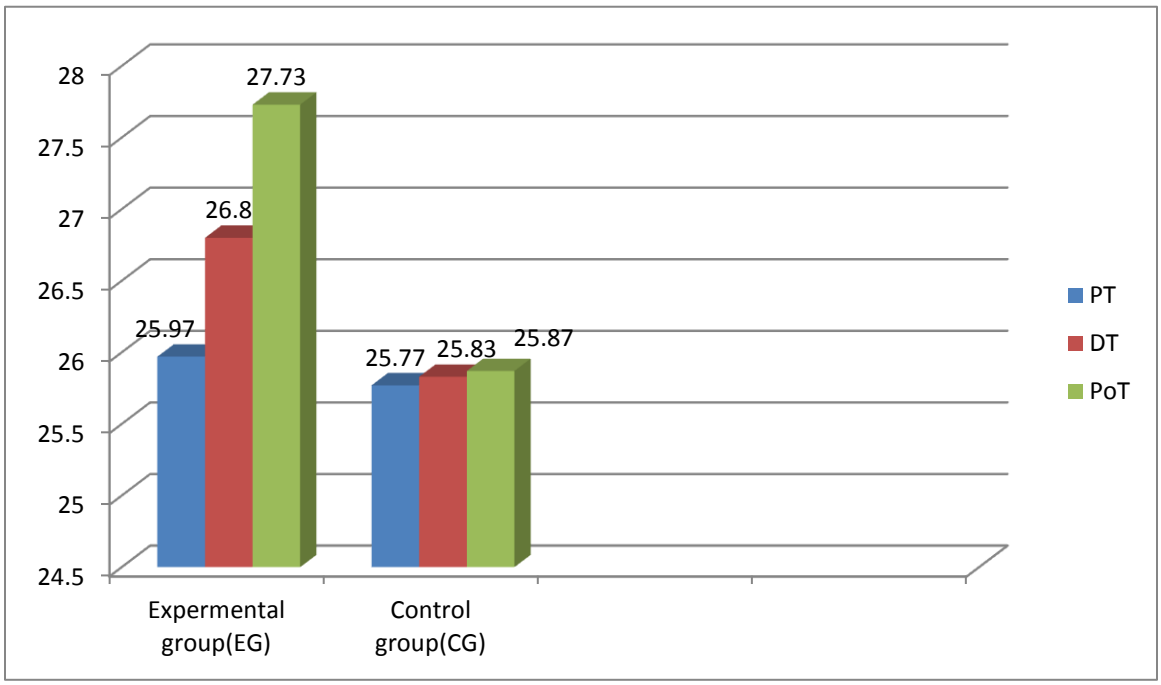


Fig1.As shown in the graph above the pre and posttest of the EG in $90^0$push up test was a mean score of 25.97 and 27.73 and also the CG was 25.77 and 25.87 respectively. From this data the investigator compute a pre and post mean difference of EG and CG in which in case of the EG repetitions of $90^0$ push up test was significantly improved by a mean difference of 1.76 at P=.000 after three months aerobic exercise training .And also in case of the CG, in which repetition of

$90^0$ push up test was poor improvement by a mean difference of 0.1 at P=0.676. The implication therefore is aerobic exercise training had improvement on push up endurance of students when compared with CG. As a result the investigator testified and accepted alternate hypotheses one and rejected the null hypothesis which said that there is a significant improvement of muscular endurance after three consecutive aerobic exercise training. But as the data shows there is no significant improvement in muscular endurance of the CG who only has a single 42 minutes of physical education practical class.

The result of this finding was consistent with the finding of shahana and his friends, who conducted the study on the effects of a twelve-week aerobic exercise program on selected health related physical fitness components in adults (Shahana *et al.,* 2010).similarly Harms and his friends who conducted During aerobic exercise, minute ventilation increases and an increased load is placed on the respiratory muscles. Both the frequency and the speed of contraction in the muscle are increased, (Harms et al., 2000).

### 4.3. Effect of Aerobic Exercise on Cardiovascular Endurance

**Table 5. The mean value of CVE (12 minutes run/walk test) for CG and EG**

| **Group** | **Test** | PT(X±SD) | **DT**(X±SD) | **PoT**(X±SD) | **∆X)PTand PoT** | **P** |
|---|---|---|---|---|---|---|
| **EG** | 12minute run test | 2865.00±270.42 | 3140.00±252.36 | 3503.00±181.43 | 638 | 0.000 |
| **CG** | 12minute run test | 2933.67±322.50 | 2935.80±317.24 | 2937.97±318.52 | 4.2 | 0.709 |

*CVE=cardiovascular endurance EG= experimental groups, CG=control group X=mean value of each tests,SD= Standard deviation, ∆X= (MD) mean difference, PT=pretest result, DT= during training result, PoT= post test results p=significance level.*

As shown from table 5 the average pretest score of EG (N=30) was found to be 2865.00 with a SD of 270.42 and CG (N=30) was found to be 2933.67 with an SD of 322.50 from this data we can see that the scores in the pretest for both groups were near. After six weeks EG score was 3140.00 with SD 252.36 and CG mean score of 2935.80 with SD score 317.24. In contrast, the average post test score after 12 week aerobic exercise training of EG was found out 3503 with SD of 181.43 and for CG mean 2937.97 with SD of 318.52. From this data we can see that the scores in the posttest for both groups were very different. One can pick up that these numbers in pretest and posttest mean scores (achievement levels) are different. Hence, these data indicated that there is a significant difference and gradual improvement between PT, DT and PoT test results of EG and there is no sufficient improvement between PT,DT and PoT test results and there is no improvement between PT,DT and PoT test results of CG.

**Figure2. Graphical presentation of 12 minutes run/walk test result of EG and CG**

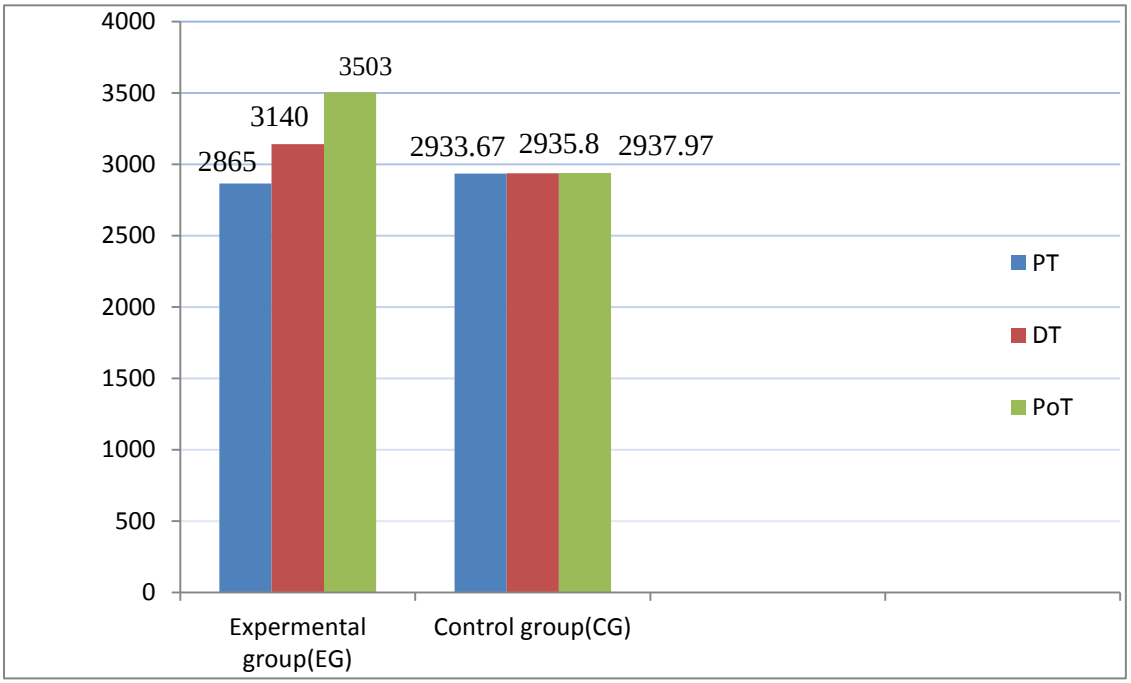


Fig2. As shown in the graph above the pre and posttest of the EG in 12 minute run/walk test was a mean score of 2865.00 and 3503.00 and also the CG was 2933.67 and 2937.97 respectively. From this data the investigator compute a pre and post mean difference of EG and CG.

In which in case of the EG distance of 12 minute run/walk test was significantly improved by a mean difference of 638 at P=0.000 after three months aerobic exercise training.

And also in case of the CG, in which distance of 12 minute walk test was poor improvement by a mean difference 4.2 at P=0.709,There was an increase and a statistical significant improvement of EG compared to a constant score in CG. The implication therefore is aerobic exercise training had improvement on CVE of students when compared with CG. As a result the investigator testified and accepted alternate hypotheses two and rejected the null hypothesis which said that there is a significant improvement of CVE after three consecutive aerobic exercise training. But as the data shows there is no significant improvement in CVE of the CG who only has a single 42 minutes of physical education practical class.

As a result this study consistent with findings of Mahendran, (2009) that conducted with selected health related variable cardiovascular endurance was measured using 12-minutes run**.** The results of pre and posttest were compared by using Analysis of Covariance. The variable was significantly improved among experimental group. Similar study Chao-Chien, & Yi-Chun, (2012) also showed on their findings of jumping rope training demonstrated significant effects on cardiovascular endurance. Moreover, Shahana et al., (2010) also conclude that improved cardiovascular endurance among the experimental group of middle-aged adults after 12 weeks of aerobic exercise. Toy, (2008) also after twelve weeks of aerobic dance training a significant in vo2 max cardio respiratory fitness among middle aged adults. In the case of control group no significant changes were seen in any of the selected studies

### 4.4. Effect of Aerobic Exercise on Flexibility

**Table 6. The mean values of flexibility (sit and reach test) for EG and CG**

| Group | Test | PT(X±SD) | DT(X±SD) | PoT(X±SD) | ∆X)PT and PoT | P |
|---|---|---|---|---|---|---|
| **EG** | Flexibility | 14.93±5.61 | 15.14±5.53 | 15.46±5.44 | 0.53 | 0.000 |
| **CG** | Flexibility | 14.69±5.57 | 14.73±5.58 | 14.79±5.62 | 0.1 | 0.212 |

*EG= experimental groups, CG=control group X=mean value of each tests,SD= Standard deviation, ∆X= (MD) mean difference, PT=pretest result, DT= during training result, PoT= post test results p=significance level.*

As shown from table 6the average pretest score of EG (N=30) was found to be 14.93with a SD of 5.61 and CG (N=30) was found to be 14.69 with an SD of 5.57. From this data we can see that the scores in the pretest for both groups were close. After six weeksEG mean score was 15.14 with SD 5.53and CG mean score of 14.73 with SD of5.58. In contrast, the average post test score after 12 week aerobic exercise training of EG was found out 15.46 with SD of 5.44 and for CG mean 14.79 with SD of 5.62. From this data we can see that the scores in the posttest for both groups were very different. One can pick up that these numbers in pretest and posttest mean scores (achievement levels) are different. Hence, these data indicated that there is a significant difference and improvement between PT, DT and PoT test results of EG and there is no improvement between PT,DT and PoT test results of CG.

**Figure 3. Graphical presentation of sit and reach test result of EG and CG**

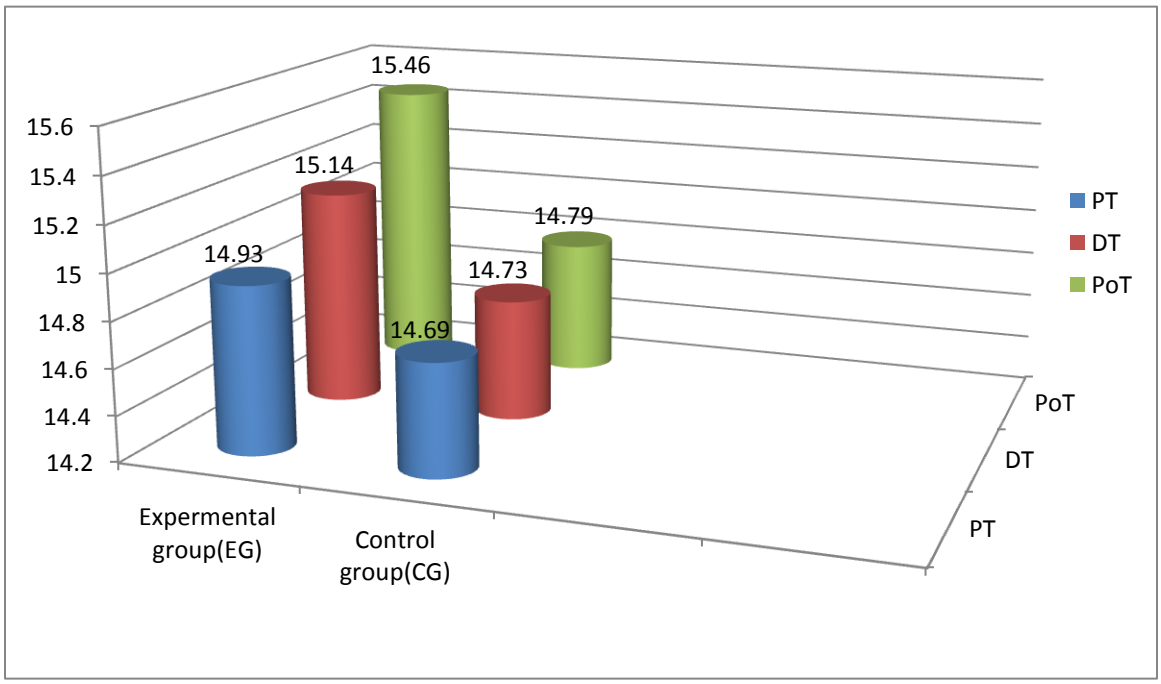


Fig3. As shown in the graph above the pre and posttest of the EG in sit and reach test was a mean score of 14.93 and 15.46 and also the CG was 14.69 and 14.79 respectively. From this data the investigator compute a pre and post mean difference of EG and CG. In which in case of the EG length of sit and reach test was significantly improved by a mean difference of 0.53 at P=0.000

after three months aerobic exercise training. And also in case of the CG in which length of sit and reach test was poor improvement by a mean difference 0.1 at P=0.212, There was an increase and a statistical significant improvement of EG compared to a constant score in CG. The implication therefore is aerobic exercise training had improvement on flexibility of students when compared with CG. As a result the investigator testified and accepted alternate hypotheses three and rejected the null hypothesis which said that there is a significant improvement on flexibility after three consecutive aerobic exercise training. But as the data shows there is no significant improvement in flexibility of the CG who only has a single 42 minutes of physical education practical class.

This result is supported by Nagaraj et al, (2011) their result shows that combined exercises of stretching and aerobics exercises were significantly in flexibility.

Moreover, Promoth, (2010) support the theory that step aerobics had significant effects on flexibility among the experimental group and no significant changes were seen in control group. Also Mahendran, (2009) showed flexibility was measured with the reliable equipment sit and reach box.

### 4.5. Comparison of three tests ($90^0$ pushup,12 minutes run,sit and reach) results of EG

**Table 7. Changes of 12 weeks aerobic exercise in the selected health related physical fitness components (ME, CVE, FLEXIBLITY)**

| ***Type of test*** | ***PT(X±SD)*** | ***DT(X±SD)*** | ***PoT(X±SD)*** | ***∆X)PT AND POT*** | ***P*** |
|---|---|---|---|---|---|
| ME ($90^0$Push up) | 25.97±6.04 | 26.80±6.18 | 27.73±6.24 | 1.76 | 0.000 |
| CVE(12 Minutes run) | 2865.00±270.42 | 3140.00±252.36 | 3503.00±181.43 | 638 | 0.000 |
| Flexibility(sit and reach test) | 14.93±5.61 | 15.14±5.53 | 15.46±5.44 | 0.53 | 0.000 |

*ME= Muscular endurance, CVE=Cardiovascular endurance X=mean value of each tests, SD= Standard deviation, ΔX= (MD) mean difference, PT=pretest result, DT= during training result, PoT= post test results p=significance level.*

The above table showed that EG there was significance difference in between the pre to post test score of ($90^0$ pushup test, 12 minutes run/walk test, sit and reach test) results due to twelve week aerobics exercise in the selected health related physical fitness components (ME, CVE and Flexibility)

all test had changes was due to Aerobic exercises in which they were engaged in. the mean score value of ME pretest before training result was (25.97) and posttest after training mean score values was (27.73) The mean difference score of pretest with mean difference score of posttest mean difference value increased by (1.76).

As indicated the tables mean value of CVE from pretest 2865.00 increased to 3503.00 posttest. CVE score of pretest to posttest mean difference value of EG increased (638) recorded.

The mean value of flexibility from pretest 14.93 increased to 15.46 posttest result. Flexibility score of pretest mean to posttest mean difference value of EG increased (0.53) recorded.

When we compare the pretest and posttest of mean difference value score in each test of 12 weeks Aerobic exercise intervention experimental groups. The first Better change observed on CVE=22.3%, second on ME=6.8%, and lowest score of mean difference value was FLEXIBLITY=3.5% respectively. The improvement rate of this data was one indicator of the great Aerobic exercise training effect on CVE=22.3% than others components. Therefore, aerobic exercise training was important for increment of CVE according to the result on this study.

# 5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

## 5.1. Summary

The purpose of this study was to evaluate the effect of aerobic exercise on selected health related physical fitness components of grade 12 students in the case of Wuchale17 general secondary and Preparatory School and to forward corrective measures to be taken in order to alleviate the encountered problems and advantages. To this end, the following basic objectives were considered.

- To measure the effects of aerobic exercise on muscular endurance using $90^0$ push up test.
- To evaluate the effects of aerobic exercise on cardiovascular endurance based on pre and posttest result of 12 minutes run/walk test.
- To examine the significance of aerobic exercise on flexibility using sit and reach test

In dealing with these basic objectives, the study conducted on grade 12 male students in case of South Wollo Ambasl Wereda Wuchale17 general secondary and Preparatory School. Among a population of 71 male students using Simple random sampling system 30 students were underwent EG of aerobic exercise training for three months, the other 30 students CG were attended one practical physical education lesson per week with experimental group EG. A pretest, during training test and posttest selected Health related physical fitness tests were taken to gain the necessary information required. The following findings were obtained from the result. More specifically;

- ✓ The findings of this study indicate that there is improvement in ME. Even if both groups had shown improvement. As a consequence of the training, the EG improvement in muscular endurance is better improvement in mean difference. In case of $90^0$ angle push up.
- ✓ The finding of this study revealed that there is improvement in CVE (aerobic fitness). Even if both groups had shown improvement. As a consequence of the training, the EG improvement in CVE is better improvement in mean difference. In case of 12 minutes run/walk test.

- ✓ The finding of this study shows that there is improvement in flexibility. Even if both groups had shown improvement, the EG improvement is better as a consequence of the training in case of sit and reach test.
- ✓ The finding of this study show that there is improvement in selected health related physical fitness (HRPF) components i.e. muscular endurance cardiovascular endurance, , and flexibility.

### 5.2. Conclusion

Previous studies have found that aerobic exercise is associated with improved health related physical fitness among students at different age and sex levels. However, it remains unclear whether associations are present in both aerobic exercise and health related physical fitness particularly.

The purpose of this study was to evaluate the associations between aerobic exercises with selected health related physical fitness components in grade twelve students in case of South Wollo Zone Ambasel Wereda wuchale17 general secondary and preparatory school. Data was drawn from a pre and posttest after 12 weeks of aerobic exercise training within selected physical fitness tests i.e. $90^0$ angle push up to assess ME,12 minute run/walk to assess CVE and sit and reach test to assess flexibility administered to selected sample male subjects (N=60). As a result, the following conclusion was made. This study indicate that aerobic exercise has its own advantage on improving students health related physical fitness particularly ME, CVE, and flexibility on the aerobic exercise EGs showed a significant difference ($p<0.05$) on the above components compared with control group.

### 5.3. Recommendations

Based on the findings of the study, the following suggestions are forwarded:

- ❖ Aerobic exercise programs should be incorporated and encouraged into the physical education lessons at school. Such programs should consider all the three health-related physical fitness components. This will help to improve the health-related physical fitness deficiencies of students.
- ❖ Students should be active participant at least 3 days per week aerobic exercise training to improve their health related physical fitness status. Thus, physical education class per

week should be increased and contents should emphasis on aerobic exercises.

- Physical education teachers as a means to improve the general fitness status of all students, recreational and sporting competitions should encourage among various classes and grade levels. Further, they should be serious on students' practical session plan implementation.
- School administrator should encourage and finance students' sport club in order to have more participation of students and to monitor their fitness status.

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# 7. APPENDECES

**Appendix- A**

**Participant's Information Sheet and Informed Consent Form**

Investigator's Name: Gashaw Birhanu (Bed in Physical Education minor Biology)

Advisor's Name: Desta Enyew (PhD)

Co-Advisor's Name: Abinet Ayalew (PhD)

**Proposal title:** Effect of Aerobic Exercise on Selected Health related Physical Fitness components in case of Ambasel Wereda Wuchale 17 General secondary and Preparatory School: South Wollo Zone, Amhara Regional State.

**Purpose of the study**:

The purpose of this study to investigate the effect of Aerobic Exercise Enhancing selected physical fitness variables of grade twelve male students. The findings of this study can be very much contributed for students. More over the aim of this study is to write a thesis for the partial fulfillment of master program in Teaching Physical Education.

**Procedure and duration**:

The experiment of the study period will take only 3 months. This study will be involves 30 subjects from Wuchale 17 preparatory school, your son will participate in aerobic exercise training 3 days per week (Monday-morning, Wednesday-morning and Friday-morning) for 12 weeks. Participation in the study will have 40-60 minutes per session. Subjects also participate in physical performance test in three phases, at the beginning, during training and at the end of 12 week training.

**Risk and safeguard**:

Your son will not perform physical activity, if he feels one of the following signs: abnormal heart rate; too fast or too slow breathing rate, etc. Incase if the son face injury or pain, the investigator will be give first aid to him. If it is severe, the investigator will be covering every cost for him to recover. There may be no personal benefit for participating in this study. However, it is hoped that, in the future the school society will beneficial from this study by

understanding the effect of aerobic exercise on muscular endurance , cardiorespiratory fitness and flexibility components and adjusting life style in doing their daily routine.

**Confidentiality:**

The information obtained from the participants, test result and other related personal information's will be kept confidential. There will be no information that will identify your son in particular. The findings of the study will be general for the study community and will not reflect anything particular of individual persons. The data/test results will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research.

**Rights**:

Participation in this study will be a fully voluntary based. You have the right to declare to participate or not in the study. And if you decide to participate, you have the right to withdraw from the study at any time and this will not label you for any loss of benefits which you otherwise are entitled

**Contact address**:

If there is any questions or enquires any time about the study or the procedures, please contact in the following address:

Institutional research ethics review committee (IRERC) at +251256661899

Desta Enyew (PhD) (Advisor): +251938310940

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**Appendix- B**

**Physical Activity Readiness Questionnaire (PARQ)**

**For Participants:** This questionnaire is prepared to obtain information on the health status and physical activity readiness Subjects participating for the study please. Read the questions carefully and answer each one honestly by encircling it on the choice letter given and describing your condition in the space provided.

Thank you.

1. Do you have a recent physical injury such as bone, muscle and joint which will be serious by physical exercise?

A. Yes B. No

If yes indicate the type of injury that you had_____

2. Do you have suffered with heart condition?

A. Yes B. No

3. Do you have any of the following risk for heart disease: for example High blood pressure,

High blood cholesterol and any close relatives (father, mother, brother etc.?)

A. Yes B. No

4. Have you ever felt pain in your chest when you do physical exercise?

A. Yes B. No

5. Have you ever suffered from shortness of breath at rest or with mild exercise?

A. Yes B. No

6. Is there any history of Coronary Heart Disease within your family?

A. Yes B. No

7. Do you ever feel feint; have spells of dizziness or have you ever lost consciousness?

A. Yes B. No

8. Are you taking any prescription medicines recently?

A. Yes B. No

If yes, name them below:-

| Name of drug | Dosage |
|---|---|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

9. Do you currently smoke?

A. Yes B. No

10. Do you know your current level of s physical fitness? _____

A. Yes B. No

11. Have you taken any health related physical fitness skill tests before? _____

A. Yes B. No

12. Do you know any other reason why you should notparticipate in a program of physical Activity?

A. Yes B. No

If yes explain your

Reasonhere_____
_____
_____

I have read and understand the form and have given accurate information regarding to my current health status.

Signed (participant player) _____date_____

Signed (examiner) _____date_____

**Source:** htt://www.Barnes fitness.co.uk

## Appendix- C

### Table 1:

### Name, Weight, Height and Age of participant

| No | Name of Student | Age | Height | Wight | No | Name of student | Age | Height | Wight |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Anwar amare | 19 | 1.75 | 56 | 31 | Girum Admase | 22 | 1.79 | 60 |
| 2 | Nurye Ahmed | 19 | 1.64 | 48 | 32 | Esmael Eshetu | 20 | 1.69 | 46.5 |
| 3 | Girma Mekonnen | 19 | 1.77 | 60.5 | 33 | Zeamanuel Gashaw | 21 | 1.74 | 65 |
| 4 | Temesgen Kibret | 18 | 1.65 | 57.5 | 34 | Dessu Tesfaye | 22 | 1.78 | 57 |
| 5 | Getahun Fentaw | 19 | 1.72 | 53 | 35 | Birhan Kassaw | 19 | 1.76 | 56 |
| 6 | Ermiyas Aragaw | 20 | 1.79 | 60 | 36 | Adane Hile | 20 | 1.75 | 47.5 |
| 7 | Biniyam Birhanu | 19 | 1.63 | 46.5 | 37 | Shimelis Arage | 20 | 1.82 | 50 |
| 8 | Temesgen Shiferaw | 19 | 1.72 | 62.5 | 38 | Kalkidan Abate | 22 | 1.66 | 66 |
| 9s | Eshetu Abate | 18 | 1.67 | 57 | 39 | Gebrye Getaneh | 20 | 1.50 | 67.5 |
| 10 | Zewdu G/Eyesus | 18 | 1.68 | 56 | 40 | Teshome Demeke | 19 | 1.76 | 55 |
| 11 | Aragaw Molla | 19 | 1.77 | 47.5 | 41 | Ephrem Tsegaye | 19 | 1.66 | 58.5 |
| 12 | Tesfaye Molla | 20 | 1.82 | 69 | 42 | Amare Tilahun | 19 | 1.82 | 52.75 |
| 13 | Amare Dejena | 19 | 1.79 | 57 | 43 | Aragaw Sied | 19 | 1.79 | 51 |
| 14 | Shamble Sitot | 20 | 1.66 | 61 | 44 | Demle Molla | 18 | 1.66 | 58 |
| 15 | Mukitar Sied | 20 | 1.65 | 50 | 45 | Endris Adem | 19 | 1.65 | 70.5 |
| 16 | Tebeje Worku | 19 | 1.78 | 58 | 46 | Kedir Eshetu | 20 | 1.78 | 57 |
| 17 | Teshale Gashaw | 20 | 1.69 | 52 | 47 | Nuru Hussen | 19 | 1.69 | 46.5 |
| 18 | Yosef Melese | 19 | 1.66 | 50 | 48 | Mabre Melaku | 19 | 1.77 | 51 |
| 19 | Natinael Assefa | 19 | 1.70 | 66 | 49 | Jemal Hussen | 18 | 1.70 | 54 |
| 20 | Muluneh Tadesse | 19 | 1.68 | 63 | 50 | Mollalign Sisay | 18 | 1.68 | 56 |
| 21 | Shimelis Worku | 19 | 1.77 | 55 | 51 | Tesfaye Sete | 19 | 1.77 | 48 |
| 22 | Zeamanuel Yimer | 19 | 1.75 | 50.75 | 52 | Kaliab Sisay | 20 | 1.75 | 60.5 |
| 23 | Jemal Hussen | 19 | 1.69 | 52.5 | 53 | Eyob Alemu | 19 | 1.69 | 57.5 |
| 24 | Zewdu Gumataw | 20 | 1.63 | 51 | 54 | Eshetu Sisay | 20 | 1.63 | 53 |
| 25 | Teshale Zeben | 21 | 1.69 | 58 | 55 | Tesfaye Haielu | 20 | 1.69 | 63 |
| 26 | Kedir Yimam | 21 | 1.89 | 70.5 | 56 | Tekle Tadesse | 19 | 1.89 | 58 |
| 27 | Tesfaye Melaku | 20 | 1.79 | 57 | 57 | Adane Aragaw | 20 | 1.79 | 69 |
| 28 | Zeamanuel Eshete | 20 | 1.85 | 46.5 | 58 | Sisay Asefa | 19 | 1.85 | 57 |
| 29 | Jemal Hussen | 18 | 1.72 | 51 | 59 | Zeamanuel Gashaw | 19 | 1.72 | 61 |
| 30 | Sete Fikrae | 19 | 1.70 | 54 | 60 | Gashaw Getaway | 19 | 1.70 | 50 |

**Appendix- D**

**Table 2: Student's Selected Physical Fitness Components & Types of test Record Sheet**

| Test code | Parameters | Type of Test | unit | EG | | | CG | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | PT | DT | PoT | PT | DT | PoT |
| T1 | ME | $90^{o}$ angle push up | Repetition | 25.97 | 26.80 | 27.73 | 25.77 | 25.83 | 25.87 |
| T2 | CVE | 12 minute run | Second | 2865.00 | 3140.00 | 3503.00 | 2933.67 | 2935.80 | 2937.97 |
| T3 | Flexibility | Sit and reach | Cm | 14.93 | 15.14 | 15.46 | 14.69 | 14.73 | 14.79 |

**Appendix- E**

**Description of the Training Schedule**

In sport training it needs well designed and prepared plan. The purpose of a training plan is to identify the work to be carried out to achieve agreed objectives and to be effective in the training program out comes. Sports fitness training plans are the strategies for achieving peak performance. In sports training plan goals or objective should be specified, participants fitness level should be assessed before, during and after training, exercise should be selected and specific to the selected fitness component needed to develop, it should follow the training principles and it should be well adjusted to the participant's fitness level and to the weather condition.

Training plan can be a short term or it can be a long term plan. Basically, some fitness components needs short term training and the others need to train for a long period of time. Due to this reason, the investigator will be concentrated on a short term training plan (three months). One of the most important rules of training for results comes back to the principles of Arnold's book (Arnold's encyclopedia of Body building) state that, the intensity of the work out and the frequency of the training session play an important in stimulating muscle growth and performance improvement. https://www.acefitness.org/blog

**Planning the session and the training weeks**

Based on the above mentioned reasons and others the researcher will use the training principles. So, this training session is designed for three months, and based on the principles of frequency, intensity, type and principle of rest and recovery it will be a three days per week, one day split(rest day) in between exercise session with 40-60 minutes of each

**Training frequency**

Frequency refers to the number of training sessions per a specific period of time such as week and month or year following any form of fitness training, the body goes through a Process of rebuild to replenish its energy reserves consumed by the exercise.

**Exercise intensity**

Exercise intensity refers to how hard the body is working during physical activity. Exercise intensity is described as low, moderate, or vigorous.

**The ranges of exercise intensity**

- Low(light) is about 40-54%MaxHR
- Moderate is 55-69%
- High (Vigorous) is ≥ 70%

For moderate intensity physical activity, a person's THR should be 50-70 per cent of their maximum heart rate. The maximum heart rate is based on a person's age. An estimate of a person's maximum heart rate can be calculated as 220 beats per minute minus your age (American College of Cardiolgy)

**Appendix - F**

**Aerobic training schedule for three months**

**Table 3:** First Month training schedule (October, 2017)

| Days per week | Types of Exercise | Week (1-4) | | | | Intensity |
|---|---|---|---|---|---|---|
| | | Time | Repetition | Rest | duration | |
| Monday | Warming up<br>Stretching exe<br>Walking<br>Rope jumping<br>Aerobic dance<br>Cooling down | 5min<br>5min<br>4min<br>4min<br>4min<br>3min | 1x5min<br>1x5min<br>2x4min<br>2x4min<br>2x4min<br>1x3min | 30sec active rest b/n each aerobic exercise | 40 minute | Moderate intensity (55-69% of HR max) |
| Wednesday | Warming up<br>Stretching exe<br>Fast walking<br>Aerobic dance<br>Rope jumping,<br>Cooling down | 5min<br>5min<br>4min<br>4min<br>4min<br>3min | 1x5min<br>1x5min<br>2x4min<br>2x4min<br>2x4min<br>1x3min | 30sec active rest b/n each aerobic exercise | 40 minute | Moderate intensity (55-69% of HR max) |
| Friday | Warming up<br>Stretching exe<br>walking<br>Aerobic dance<br>Rope jumping,<br>Cool down | 5min<br>5min<br>4min<br>4min<br>4min<br>3min | 1x5min<br>1x5min<br>2x4min<br>2x4min<br>2x4min<br>1x3min | 30sec active rest b/n each aerobic exercise | 40 minute | Moderate intensity (55-69% of HR max) |

The above schedule was prepared based on description of training plan my own work

**Table 4**: Second Month training schedule (November, 2017)

The main objectives of this training schedule is to improve health related physical fitness Components of wuchale 17 general secondary and preparatory school grade 12 male students.

| Day per week | Types of Exercise | Week (5-8) | | | | Intensity |
|---|---|---|---|---|---|---|
| | | Time | Repetition | Rest | Duration | |
| Monday | Warming up<br>Walking<br>Jogging<br>Rope skipping<br>Aerobic dance<br>Cooling down | 6min<br>5min<br>4min<br>5min<br>5min<br>3min | 1x6min<br>2x5min<br>2x4min<br>2x5min<br>2x5min<br>1x3min | 30 second active rest b/n each exercise | 50 minute | Moderate intensity(55-69% of HR max) |
| Wednesday | Warming up<br>Walking<br>Jogging<br>Rope skipping<br>Aerobic dance<br>Cooling down | 6min<br>5min<br>4min<br>5min<br>5min<br>4min | 1x6min<br>2x5min<br>2x4min<br>2x5min<br>2x5min<br>1x3min | 30 second active rest b/n each exercise | 50 minute | Moderate intensity(55-69% of HR max) |
| Friday | Warming up<br>Walking<br>Jogging<br>Rope skipping<br>Aerobic dance<br>Cooling down | 6min<br>5min<br>4min<br>5min<br>5min<br>4min | 1x6min<br>2x5min<br>2x4min<br>2x5min<br>2x5min<br>1x3min | 30 second active rest b/n each exercise | 50 minute | Moderate intensity(55-69% of HR max) |

The above schedule was prepared based on description of training plan my own work

**Table5:** Third Month training schedule (December 2017)

The main objectives of this training schedule is to improve selected health related physical fitness Components of Wuchale 17 General Secondary and Preparatory School Grade 12 male students.

| Day | Types of Exercise | Week (9-12) | | | | Intensity |
|---|---|---|---|---|---|---|
| | | Time | Repetition | Rest | Duration | |
| Monday | Warming up<br>Walking<br>Jogging<br>Rope skipping<br>Aerobic dance<br>Cooling down | 6min<br>6min<br>6min<br>6min<br>6min<br>3min | 1x6min<br>2x6min<br>2x6min<br>2x6min<br>2x6min<br>1x3min | 30 second active rest b/n each exercise | 60 minute | Moderate intensity(55-69% of HR max) |
| Wednesday | Warming up<br>walking<br>Jogging<br>Rope skipping<br>Aerobic dance<br>Cooling down | 6min<br>6min<br>6min<br>6min<br>6min<br>3min | 1x6min<br>2x6min<br>2x6min<br>2x6min<br>2x6min<br>1x3min | 30second active rest b/n each exercise | 60 minute | Moderate intensity(55-69% of HR max) |
| Friday | Warming up<br>Walking<br>jogging<br>rope skipping<br>Aerobic dance<br>Cooling down | 6min<br>6min<br>6min<br>6min<br>6min<br>3min | 1x6min<br>6x6min<br>2x6min<br>2x6min<br>2x6min<br>1x3min | 30second active rest b/n each exercise | 60 minute | Moderate intensity(55-69% of HR max) |

The above schedule was prepared based on description of training plan my own work

**Appendix- G**

**Paired sample T- tests of parameters**

**Table6**: $90^0$ angle push up test for EG (pre-during and pre-post result)

| | Paired Differences | | | | | t | Df | Sig.(2-taiied |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | Lower | upper | | | |
| Pair 1 Pre-During | -0.833 | .592 | .108 | -1.054 | -.612 | -7.709 | 29 | 000 |
| Pair 2 pre-Post | -1.767 | .679 | .124 | -2.020 | -1.513 | -14.253 | 29 | 000 |

**Table7**: $90^0$ angle push up test for CG (pre-during and pre-post result)

| | Paired Differences | | | | | T | Df | Sig.(2-taiied |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | lower | upper | | | |
| Pair 1 Pre-During | -.067 | 1.015 | .185 | -.446 | .312 | -.360 | 29 | .722 |
| Pair 2 pre-Post | -.100 | 1.296 | .237 | -.584 | .384 | -.423 | 29 | .676 |

**Table8**: 12 Minute run/walk test for EG (pre-during and pre-post result)

| | Paired Differences | | | | | T | Df | Sig.(2-taiied |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | lower | upper | | | |
| Pair 1 Pre-During | -275.000 | 266.118 | 48.586 | -374.370 | -175.630 | -5.660 | 29 | 000 |
| Pair 2 pre-Post | -638.333 | 201.581 | 36.804 | -713.605 | -563.062 | -17.344 | 29 | 000 |

**Table9:** 12 Minute run/walk test for CG (pre-during and pre-post result)

| | Paired Differences | | | | | T | Df | Sig.(2-taiied |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | lower | upper | | | |
| Pair 1 Pre-During | -2.133 | 47.879 | 8.741 | -20.012 | 15.745 | -.244 | 29 | .809 |
| Pair 2 pre-Post | -4.200 | 61.113 | 11.158 | -27.020 | 18.620 | -.376 | 29 | .709 |

**Table10:** Sit and reach test for EG (pre-during and pre-post result)

| | Paired Differences | | | | | T | Df | Sig.(2-taiied |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | lower | upper | | | |
| Pair 1 Pre-During | -.20167 | .25922 | .04733 | -.29846 | -.10487 | -4.261 | 29 | 000 |
| Pair 2 pre-Post | -.53000 | .55036 | .10048 | -.73551 | -.32449 | -5.275 | 29 | 000 |

**Table11:** Sit and reach test for CG (pre-during and pre-post result)

| | Paired Differences | | | | | T | Df | Sig.(2-taiied |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | lower | upper | | | |
| Pair 1 Pre-During | -.04200 | .20682 | .03776 | -.11923 | .03523 | -1.112 | 29 | .275 |
| Pair 2 pre-Post | -.09900 | .42526 | .07764 | -.25779 | .05979 | -1.275 | 29 | .212 |

**Appendix- H**

## Test protocols/ norms

**Table12: Test Protocols of Ninety Degree Push up**

| **Men (age)** | **17-26** | **27-39** |
|---|---|---|
| **Classification** | **Number of repetition** | **Number of repetition** |
| High performance zone | $29^{+}$ | $27^{+}$ |
| Good fitness zone | 20-28 | 18-26 |
| Marginal zone | 16-19 | 15-17 |
| Low zone | <16 | <15 |
| **Women** | **17-26** | **27-39** |
| High performance zone | $17^{+}$ | $16^{+}$ |
| Good fitness zone | 12-16 | 11-15 |
| Marginal zone | 8-11 | 7-10 |
| Low zone | <8 | <7 |

SOURCE: Ethiopia physical Education text book grade 12, 2006 E.C

**Table13: Test Protocols of 12 minute Run/Walk Test**

| **Man (age)** | **17-26** | **27-39** |
|---|---|---|
| **Classification** | **Distance Covered** | **Distance Covered** |
| High performance zone | 2888m$^{+}$ | 2560m$^{+}$ |
| Good fitness zone | 2480-2879m | 2320-2559m |
| Marginal zone | 2150-2479m | 2080-2319m |
| Low zone | <2150m | <2080m |
| **Women (age)** | **17-26** | **27-39** |
| **Classification** | **Distance covered** | **Distance covered** |
| High performance zone | 2320m$^{+}$ | 2160m$^{+}$ |
| Good fitness zone | 2000-2319m | 1920-2159m |
| Marginal zone | 1040-1999m | 1680-1919m |
| Low zone | <1040 | <1680m |

SOURCE: Ethiopia physical Education text book grade 12, 2006 E.C

**Table 14: Test Protocols of sit and reach test**

| **Classification** | **Women** | **Men** |
|---|---|---|
| Normal range | 101mm to + 250 | +152mm to +202mm |
| Average /mean/ | +50mm | +25mm |
| Desired range | +50mm | +25mm to + 127mm |

SOURCE: Ethiopia physical Education text book grade 12, 2006 E.C

## Appendix- I

**Figure 1: pictures while investigator on the task before pre tests**


Figure one show that the investigator orient the subjects how to perform each test

**Figure 2: Subjects Picture on $90^0$ angles Push up Test**


Figure two shows that one of the subjects is executing 90 degree angle push up test and the investigator is recording the score.

**Figure 3: Subjects Picture on 12 Minute Run Test**

Figure three shows that the subjects taking 12 minutes run/ walk test

**Figure 4: pictures while students take flexibility (sit and reach) test**

**Figure 5: pictures while students during aerobic exercise**

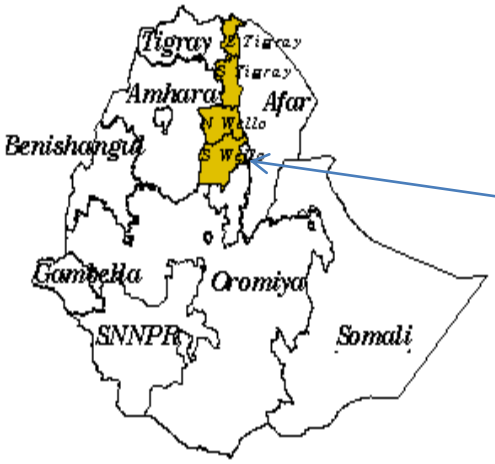




Figure five shows that the subjects are walking, running, jogging, jumping, dancing, rope skipping on the field .those are aerobics exercise improve health related physical fitness (ME,CVE and FLEXIBLITY).

**Figure 6: Map of the study site**

Ethiopia




Amhara regional state map


South Wollo


**Source**; htt://www.gogle map/south wollo/wuchale.com.et/search?q=goggle+map+picture