

Addis Ababa University
College of Education and Behavioral Studies
Department of Science and Mathematics Education

**Effects of Physical Exercise on the Improvements of Health
Related Fitness: the Case of Merssa High School**

By

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Addis Ababa University
Addis Ababa, Ethiopia
September 2024

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A M.Ed. Thesis

**Submitted to the Department of Science and Mathematics Education in
Partial Fulfillment of the Requirement of the Degree of Master of Education
in Teaching Physical Education**

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Department of Science and Mathematics Education

Declaration

This is to certify that the Thesis prepared by Birhan Dejen entitled as “**Effects of Physical Exercise on the Improvements of Health Related Fitness: the Case of Merssa High School**” and submitted to the Department of Science and Mathematics Education in partial fulfillment for the requirement of the Degree of Masters of Education in teach physical education complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Acknowledgements

I would especially like to express my gratitude to my advisor Mulugeta W/Michael (Ph.D.), without whose invaluable advice, constant patience, constructive criticism, unwavering guidance, and direction this thesis would never have reached this point. Lastly, I would like to express my gratitude to my closest friends and family for their unwavering support and motivation over the years I have been studying.

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List of Acronyms used in this text

BMI Body Mass Index

CG Control Group

CVF Cardio vascular fitness

EG Experimental Group

FIBA Federation International basketball association

HRPF Health related physical fitness

MD Mean Difference

ME Muscular endurance

MS Muscular strength

NASPE National Association of Sport and Physical Education

PE Physical Education

POT Post-test

PT Pre-test

Abstract

The purpose of this study was to evaluate the effects of physical exercise on health related fitness components of students. Experimental research design was employed to investigate health related fitness improvements. Totally, 33 grade 11 students were selected among 215 students using purposive sampling techniques. Data were collected through field based exercises on the health related fitness components using observation worksheet on the performance of study population. Training exercises were conducted for twelve weeks for sixty minutes each day. SPSS software version 20 was used to analyze and compute the data gathered through field based pretest and posttests of performances with the significance threshold of established p -value < 0.05.

As a result, showed that the effect of exercises has improved the fitness performances of students HRF in several aspects.

Key terms: Body mass Index, Effects, Health Related Fitness, Physical Exercise and Physical Fitness,

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the Study

Physical activity and sports have existed since the dawn of human history. Prehistoric man used his greater intelligence to recognize the significance of fitness in the age of survival of the fittest, eventually outsmarting the animals he eventually overruled. Professional guidance for enhancing performance and raising safety standards became thought to be necessary when man was still a primitive and sport had become organized and competitive. Sports, a component of human life since ancient times, have changed significantly with the rise of civilization. Physical activity was played only for enjoyment of participation (Laila, 2006).

Regardless of age, physical activity has positive impacts to the individual physical fitness. Progressive exercise that is done correctly raises fitness levels and enhances health. Additionally, it increases energy, fosters a sense of well-being, and lowers the chance of contracting numerous illnesses. The bodily systems undergo morphological and physiological adaptations as a result of exercise, which places demands on them beyond those of regular daily activities (Rosser, 2001).

The majority, if not all, of the bodily functions—muscle, cardio-respiratory, hemato-circulatory, psycho-neurological, and endocrine metabolic—that are engaged in engaging in regular physical activity and/or exercise are measured holistically as physical fitness (Ortega et al., 2008). All of these systems' functional condition is genuinely examined when physical fitness is measured. This is the reason that one of the most significant health indicators today is physical fitness, which also serves as a predictor of morbidity and mortality from cardiovascular disease (CVD) and other causes. Although it is mostly inherited, environmental influences can have a significant impact on physical fitness. One of the primary variables is physical activity (Andersen, 2003). According to Garzón (2009), physical fitness is the capacity and attributes that are linked to a reduced risk of developing chronic illnesses and dying young, as well as the ability to carry out everyday tasks with energy and effectiveness.

Education must occur primarily through the official process of physical education in our schools if we are to build a nation that is strong physically, mentally, spiritually, and socially (Buchres, 1975).

There is a longstanding and well-established tradition in schools of connecting physical education to the Aristotelian idea of the harmonious development of the body and mind. Put another way, it is a crucial element of the educational program and a significant part of the entire school program that supports each student's general growth and development, mostly through experiences with physical activity (Pangrazi & Darst, 2002). According to Brubaker (2011), it offers students numerous chances to enhance their lifestyle. Primarily, it gives them the chance to enhance their physical well-being, growth, and health.

Physical education instruction that fosters enjoyable, lifetime physical activity has the potential to improve students' health in schools. Regretfully, in order to devote more class time to meeting these academic standards, many schools have lowered their physical education offerings (Lavall, 1984).

In a similar vein, the Ministry of Education in Ethiopia has been creating curricula for physical education in secondary schools that consist of one 40-minute class per week. In comparison to other academic subjects, it is a smaller class size designed to guarantee and develop students' maximum physical fitness and help them reach their individual goals for a variety of sports, work-related activities, and leisure pursuits (VDE, 2006).

However, productivity and the ability to solve social and personal problems are the primary goals of Ethiopia's quality education system, which is available to all (Ministry of Education, 1994).

Physical education receives less time in secondary schools in Merssa than other subjects. Due to the fact that these students in grade eleven, demonstrated limitations in their physical fitness status during the researcher's evaluations in his physical education practical classes. Because of this, the study's objective was to determine how exercise affected a few physical fitness-related variables in grade eleven students.

1.2 Statement of the Problem

Exercise can improve musculoskeletal development and body composition, leading to immediate health advantages. A high-quality physical education program is essential for teaching students the value of exercise, helping them to become physically competent, and helping them to develop a cognitive understanding of physical activity so that can lead healthy, active lives (National Association for Sport and Physical Education, 2010).

The main driving force for the researcher's decision is to concentrate on the impact of exercise on the physical fitness component of health is the strong recommendation that an active lifestyle be enhanced by physical fitness. Engaging in physical exercise is crucial in addressing and improving students' fitness levels. As per the World Health Organization (2006), leading an active lifestyle not only improves an individual's physical and emotional well-being but also their overall health, as physical activity is not just restricted to sports and organized leisure. They are found everywhere—in neighborhoods, at places of employment and education, and in medical and educational facilities.

In addition, the researcher's lowly experience as a secondary school teacher—where she saw students performing poorly in physical education during practical classes—inspired her to pursue this topic. As per the American College of Sports Medicine (2009), engaging in moderate physical activity for at least 30 minutes a day, three days a week, can result in noteworthy health advantages. Similarly, the World Health Organization (2006) recommends walking 10,000 steps a day to promote good health.

However, this is accurate in the sense that the researcher was engaged by and was working at Merssa Secondary School when they noticed low levels of PA and PF attributes during physical education lessons. In comparison to other disciplines, the time allotted in Merssa Secondary School had fewer credits, which could have limited their ability to advance and increase the intensity of their activity. This trend might have made students develop poor fitness levels against expected norms in each grade level.

The majority of students nowadays are aware that exercise improves physical fitness. Regrettably, they do not exercise, and as a result, they do not meet expectations regarding their level of physical fitness, particularly in relation to health. These motivated the researcher to examine how physical activity affects health-related fitness components in 11th grade students.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of this study was to investigate the effects of training exercise on health related fitness components in Mersa high school.

1.3.2 Specific objectives

The specific objectives of this study are to:

1. Identify effects of exercises on the development of muscular strength and endurance, cardio-respiratory endurance, flexibility and body composition
2. Find out how exercises support all health related fitness
3. Investigate on how fitness exercise improve the development of fitness components

1.4 Research questions

The study is hoped to answer the following research questions.

1. What effect does exercise have on increasing cardio-respiratory endurance?
2. What effect does exercise have on increasing muscle strength, endurance, and flexibility?
3. What effect does exercise have on improving student's body composition?

1.5 Significance of the Study

The main aim of this study was to investigate the effect of physical exercise on health related fitness components.

The researcher believes that the study was provide valuable information about the importance of health related physical fitness

- It motivates and encourages students to engage in physical exercise to boost their physical fitness.
- In the Physical Education teachers, select appropriate exercise physical education practical class.
- To help policy makers and educational leaders to examine and evaluate the relevance of curriculum appropriateness to the grade level and review accordingly.

1.6. Delimitation of the Study

This study was delimited to Merssa secondary school grade 11 students on the components of health related physical fitness such as cardio-respiratory fitness, ME, and muscular strength, flexibility & body composition. Sixty six Subjects were selected at Merssa high school grade 11th student's age ranging between 15 to 22 years. The time of training was limited to three days per week and 60 minutes per session for 12 weeks.

1.7. Limitation of the Study

The most pressing problems encountered by the researcher in the course of conducting this research work were:

- Lack of internet access,
- The cultural and religious factors
- The distance of rural area students from school
- Some students were not be able to attend regularly the training sessions;
- Lack of local reference materials.

However, the researcher used repeated attempts to solve each problem and did it.

1.8. Organization of the Study

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

Chapter two

2. Review of related literatures

2.1 The Concept of Physical Fitness

Numerous academics have defined physical fitness in various works of literature. Baltimore et al. (1995) defined physical fitness as the body's capacity to engage in moderate-to-intense physical activity without experiencing excessive exhaustion and the ability to sustain these capacities over the course of a lifetime. According to Singh A. et al. (1999), the American College of Sports Medicine has further defined physical fitness as a collection of attributes related to the capacity to engage in physical activities, such as the strength and endurance of muscles, flexibility of joints, and the work capacity of the heart and lungs. According to Corbin et al. (2006), physical fitness is linked to an individual's capacity to work efficiently, enjoy leisure activities, maintain good health, fend off hypo-kinetic illnesses, and handle emergency situations. Thus, it is a basic need of existence that can be fulfilled by engaging in regular physical activity.

2.2 Benefits of Physical Fitness

Physical attributes including cardiovascular capacity, stamina, speed, flexibility, total strength, and body composition and neuromuscular coordination are all considered components of physical fitness. Maintaining physical fitness plays a major role in preserving optimal health. Among its many advantages are the prevention of numerous diseases, the development of an immune system to combat infections and other illnesses, and assistance in preventing many of the main cardiovascular problems. Furthermore, the delaying of the ageing process is due to physical fitness. A sound body makes a significant contribution to a sound mind. By promoting a healthy psychological state, physical exercise guards against mental illness (Corbin, 2006).

2.3 Components of Physical Fitness

2.3.1 Health Related Physical Fitness

Fitness components that focus on maximizing health benefits and preventing the onset of disease and difficulties linked with insufficient activity are considered health-related fitness components. Garzón (2009) defines health-related physical fitness as those elements of fitness that have demonstrated a stronger correlation with health status, as well as a potential correlation with happiness and well-being. According to Caspersen et al. (2000), health-related fitness is defined

as having the energy, alertness, and capacity to carry out everyday tasks without experiencing undue exhaustion. It also includes characteristics and abilities linked to a lower risk of chronic illnesses and early death. A person who is at the right level of health-related fitness can: handle emergencies; lower their chance of illness and injury; work well; and engage in and enjoy physical exercise. A person can respond to crises, lower their risk of illness and injury, work more productively, engage in and enjoy physical activity (sports, leisure), and be at their physical best when they have the proper degree of health-related fitness (Connecticut State Department of Education, 2009).

Health-related fitness enhances quality of life and does the following additional benefits: it builds muscle tone and strength, reduces susceptibility to illnesses and injuries, increases bone mineral density and lowers the risk of osteoporosis; it improves posture; it increases respiratory and circulatory system efficiency; it lowers the risk of stroke and cardiovascular disease; it raises blood pressure; it lowers the risk of diabetes and some cancers; it boosts self-esteem and confidence; it reduces body fat and improves metabolism; and it increases energy level and academic achievement (Department of Education in Virginia, 2006).

2.3.1.1 Cardio Respiratory Endurance

Cardio Respiratory Endurance also known as aerobic fitness or cardio respiratory fitness is regarded as a crucial element of health-related physical fitness, according to Bouchard et al. (2002). It gauges the heart's capacity to supply working muscles with blood that is rich in oxygen when they are exercising. It also gauges how well muscles are able to absorb and utilise oxygen that has been supplied in order to create the energy required to keep working out. Exercises that fall under the category of cardio respiratory endurance include distance running, swimming, cycling, rope skipping, and jogging. Cardiopulmonary fitness decreases the risk of type II diabetes, lowers blood pressure, increases bone density in weight-bearing bones, and lengthens life expectancy.

Because the heart must pump more blood to the various muscles during exercise than it does in a normal situation, the heart rate rises. The increase in exercise intensity is closely correlated with this rise in heart rate. The average heart rate is between 60 and 72 beats per minute, but it can reach 165 to 190 beats per minute when exercising. Because aerobic exercise is prolonged and low-intensity, endurance training causes a drop in resting heart rate. Following regular aerobic exercise, heart rate drops by 20–40 beats per minute during sub-maximal exercise. When

engaging in aerobic exercise including heavy lifting for a duration of 15-20 minutes or more, and keeping the heart rate between 60-80% of maximum heart rate, the maximum heart rate stays either constant or longer while maintaining 60-80% of maximum heart rate, maximum heart rate remains either unchanged or decreases slightly with training (Shepherd, 2001).

2.3.1.2 Muscular Strength

The maximum force a muscle can produce during a single contraction is referred to as its muscular strength (De Vries and Housh, 2004). How much weight a person can lift in a single, maximal effort can be used to gauge this. Muscular strength exercises serve to lower the risk of joint and muscle injuries that may arise during physical activity, according to Stone (2000). Strength training helps to increase muscular strength. It enhances one's attractiveness and self-esteem and is linked to greater muscle tone and strength. Exercises such as push-ups, sit-ups, lifting large weights, and other exercises are used to build this kind of exercise (Stephens, 2001).

2.3.1.3 Flexibility

The range of motion around the joint is referred to as flexibility. As mentioned by Cady et al. (2002), everyone requires a certain amount of flexibility to carry out daily tasks. Flexibility may help lessen low back discomfort and is helpful in preventing some forms of muscle tendon damage. Increased joint mobility, resistance to muscular injury, prevention of low back problems, efficient body movement, and good posture, which enhances beauty, are just a few of the numerous advantages of greater flexibility. The "sit-and-reach" test is used to measure flexibility (Clark et al., 2001).

2.3.1.4 Muscular Endurance

The capacity of a muscle to carry out an action for an extended length of time is known as muscular endurance. In sports like football (repeated running and kicking), tennis (repeated arm swings to hit the ball), and swimming (repeated strokes), muscular endurance is crucial. Exercises like push-ups, sit-ups, rope skipping, jogging, and others can help build muscular endurance (Lee et al., 2010). Muscular endurance was also described by Roth (2001) as the capacity to maintain a specific degree of muscle tension. Maintaining healthy posture, preventing injuries, handling daily physical demands, and improving performance in sports and the workplace all depend on muscular endurance. Similar to muscle strength, muscular endurance is

achieved by subjecting the muscles to a load (weight) that is higher than their natural state (Roth, 2001).

2.3.1.5 Body Composition

What is the percentage of fat to lean tissue in the body? In contrast to fatty tissue, which is made up of internal vital fat around organs and body fat (subcutaneous fat), lean tissue is made up of muscle, bone, skin, internal organs, and body water. Usually, body composition is shown as a percentage of lean body mass (LBM) or as a proportion of fat (body fat percentage, or %fat). Individuals with an ideal body composition generally feel better overall, move more smoothly and readily, and are generally healthier than individuals with a less-than-perfect composition. Enhancing quality of life and general wellness can be greatly aided by reaching a more optimum body composition (Welborn et al., 2003). You will burn more calories the more exercise you get in. As a result, if you raise your physical activity level without increasing your food intake, your body will use its stored fat to provide the additional energy you require (Lee et al., 2010).

Fat is the primary factor that matters when it comes to health; everything else is referred to as lean body tissue. Everybody carries a different amount of fat, and age and gender have an impact on healthy averages. Obesity and underweight can lead to health problems. For men, 15–18% of their body weight should be fat, while women should aim for 20–25%. Fitness is demonstrated by having an ideal fat to lean mass ratio, and the right exercises can help you reduce body fat and either gain or maintain muscle mass (Head Quarters Department of the US Army, 2001).

2.5 Effects of physical Exercise

The impact of physical exercise training on physical fitness has been the subject of numerous researches. Among them are: Mathewos, (2013) conducted research on how aerobic exercise might enhance the physical fitness components connected to health in the inactive female community at Dilla University. This study set out to find out how aerobic exercise affected the inactive female population at Dilla University in terms of physical fitness components connected to health. The study's findings showed that while body weight and body mass index decreased, cardiovascular endurance, muscular endurance, and muscular strength and flexibility all significantly improved. The study came to the conclusion that moderate aerobic exercise has a favourable impact on the development of health-related physical fitness components of health related physical fitness components of sedentary female communities.

Toy (2008) also found that aerobic dancing training affected early middle-aged women's body composition and Vo₂ max. This finding has shown that vo₂ max, body weight, BMI, and body fat % had been significantly decreased. According to this study, middle-aged women who participate in aerobic dance instruction had higher levels of physical and cardiopulmonary fitness.

Additionally, Mahendran (2009) studied how a 12-week aerobic exercise program affected some physiological and health-related physical fitness measures in teenagers. A hand grip dynamometer was used to evaluate muscular strength, a bent knee sit-up was used to measure muscular endurance, a 12-minute run/walk was used to measure cardio-respiratory endurance, and a sit-and-reach box was used to measure flexibility. Body weight and height are used to calculate body mass index. This result demonstrated that the experimental group had significantly improved all variables.

2.6 Effects of Physical Exercise on Cardio Respiratory Fitness

According to Corbett (2009), a person's cardiovascular endurance level influences their likelihood of developing an illness, their quality of life, and their capacity to respond to sudden, intense physical and mental stress. Greater cardiovascular endurance in healthy persons also denotes a better level of physical fitness. Numerous studies show that following aerobic exercise, cardio-respiratory fitness increased. Changes in body composition and specific cardio-respiratory responses to exercise after a 12-week aerobic dance program were studied by Lexie et al. (2008). These results demonstrated that during sub-maximal exercise, notable improvements were seen in heart rate, oxygen saturation, and subjective exertion.

The effects of a 10-week step aerobics training program on the aerobic power and body composition of college-age women were also studied by John P. Porcari, et al. (2009). This study set out to find out how a 10-week step aerobics training program affected the aerobic power and body composition of women in college. For ten weeks, subjects in the experimental group worked out three times a week, whereas those in the control group did not. Based on these results, the experimental group's peak oxygen consumption, maximal minute breathing, and time to exhaustion on the treadmill all showed a substantial ($p < 0.05$) improvement in contrast to the control cohort. However, neither group showed a substantial ($p > 0.05$) reduction in body fat percentage. Partavi (2013) also studied how a seven-week rope-jump training program affected the middle school male students' speed, endurance, and agility. Based on these results, the

researcher came to the conclusion that a 7-week rope jump training program is a useful tool for increasing middle school boys' cardio-respiratory fitness and agility. Numerous studies have generally demonstrated that aerobic exercise improves the body's cardiopulmonary system. The trained person's maximum oxygen consumption increases during maximal aerobic exercise, and they are better equipped to utilize oxygen and fuel, which can supply more energy to working muscles.

2.7 Effects of physical Exercise on Body Composition

Frequent exercise has a significant impact on the anthropometric and hematologic levels of obese and overweight women while also lowering the body fat percentage without causing muscle loss (Evrimet al., 2010). It has been demonstrated that aerobic activity, such as swimming, jogging, and walking, is an efficient strategy to reduce weight; Physical Make-Up Changes: Regular aerobic exercise lowers body mass and body fat in adults who are overweight or borderline overweight. Increases in body mass that is free of fat also coincide with consistent resistance training.

Everim-Cakmak et al. (2006) looked into how aerobic dance exercise affected sedentary women's changes in body composition that were linked to changes in weight. This study looked at how aerobic dance affected the body composition of overweight, sedentary women. According to this study, there were significant differences ($p < 0.05$) between the pretest and posttest for the following parameters: weight, body mass index, waist circumference, waist hip ratio, metabolic, and body composition parameters in the exercise group. Everim-Cakmak et al. (2006) investigated the effects of aerobic dance exercise on changes in body composition associated with weight changes in sedentary women.

2.8. Tests for Health Related Physical Fitness of Children

2.8.1 Test for aerobic capacity (cardio-respiratory endurance)

The maximum rate at which the body can absorb and use oxygen when exercising is referred to as aerobic capacity. Reduced health issues have been linked to high aerobic capacity. Aerobic capacity tests measure endurance to determine the cardio-respiratory system's capacity (California Department of Education, 2011).

$VO_2 \text{ max equals } (.21 \times \text{gender} \times \text{age}) + (.34 \times \text{time} \times \text{time}) + 108.94 - (.84 \times \text{BMI}) - (8.41 \times \text{time})$ Gender is equal to 1 for men and 0 for women. Minutes are used to measure time. For the purposes of this equation, convert the one-mile run time from minutes and seconds to minutes by

dividing the seconds by 60 and adding the resultant decimal to the minutes. The Body Mass Index is known as BMI (Department of Education in California, 2011).

2.8.2 Tests for muscle strength, endurance, and flexibility

The musculoskeletal system's (the body's muscles and bones) overall health is determined by the muscular strength, endurance, and flexibility fitness area. Muscles must work hard (strength), continuously (endurance), and flexible enough to allow for full range of motion at the joints (flexibility) for this system to function in a balanced, healthy manner. This aspect of fitness is crucial because it can lessen potential limitations on an adult's ability to live independently, such as persistent lower back pain (Mariluet al., 2010). Four main areas are tested to assess the state of the musculoskeletal system: (1) flexibility; (2) trunk extensor strength and flexibility; (3) upper body strength and endurance; and (4) abdominal strength and endurance (Jonatan, et al., 2006).

2.8.2.1 Abdominal strength and endurance

Maintaining proper posture and pelvic alignment requires a strong and flexible abdomen. It is crucial for preserving the health of the lower back as well. The only test used to assess this area of fitness is the Curl-Up (Arlene et al., 2006). Curl-up: Students must perform as many curl-ups as they can at a set pace of roughly one every three seconds, up to a maximum of 75. It is recommended to use a prerecorded CD or tape to call or play the pace. Students lay flat on a mat on their backs with their knees bent at a 140-degree angle, their feet flat, and their hands by their sides, palms down. Students curl up and move slowly, running their fingers along a measuring strip on the mat, then coil backward until the head makes contact with it. Pupils are dismissed at four minutes, after they have completed 75 curl-ups, or during the second form break (Mariluet al., 2010).

2.8.2.2 Trunk extensor strength and flexibility

Trunk lift: Using their back muscles, students should slowly raise their upper body off the ground to a maximum of 12 inches while lying on their stomachs with their arms straight down by their sides on a mat. Pupils must hold the position for the measurement, which is the distance measured in whole inches only from the student's chin to the floor. Students should be told to fix their gaze on a specific area of the floor during the exam. The student goes back to where they were before taking the measurement. The highest score is recorded after a second trial (Committee of Experts on Sports Research Euro fit, 2000).

2.8.2.3 Upper body strength and endurance

Strength and endurance in the upper body is a crucial component of fitness that supports the preservation of good posture and functional health. Arms flexed: Students are told to hang by their arms and dangle their chin above a bar for as long as they can when performing the flexed-arm hang. When the student's chin falls below the bar or the second form break happens, they are stopped. Seconds are used to measure the duration of hanging (Arlene et al., 2006).

2.8.2.4 Flexibility

One essential element of health-related fitness is joint flexibility, which applies to both the upper and lower bodies (ACSM, 2006). Seated and reaching back saver: The hamstring muscles' degree of flexibility is primarily assessed by the back-saver sit and reach test. Pupils are to cover the designated distance on both their left and right sides of the body. The student begins by sitting, touching the box that is required for the test, and bending their right leg before reaching forward with both hands along the box's scale. The pupil extends their arm four times, maintaining their position for a minimum of one second on each reach. Up to a maximum of 12 inches and to the nearest inch, the student's reach is measured. To calculate the reach distance using the same process is performed on the opposite side of the body, but with the legs bent instead of extended. The two sides of the body receive separate scores (ACHPER, 1994).

2.8.3 Body composition

The different components that go into a person's total weight (percentage of muscle, bone, organ, and fat content) are the focus of the body composition fitness area. Body mass index: Also known as the BMI, the body mass index is not a measure of body fat. Rather, it offers details on how a student's weight should be in relation to their height. It is not advised to use the body mass index to determine a student's body composition, especially if they have a lot of muscle mass (ACSM, 2006).

$$\text{Body mass index} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

Chapter three

3. Methodology

3.1 The Study Area

The study was carried out in Mersa Secondary School; North Wello Zone found in Amhara Regional National state; situated 500 km the capital.

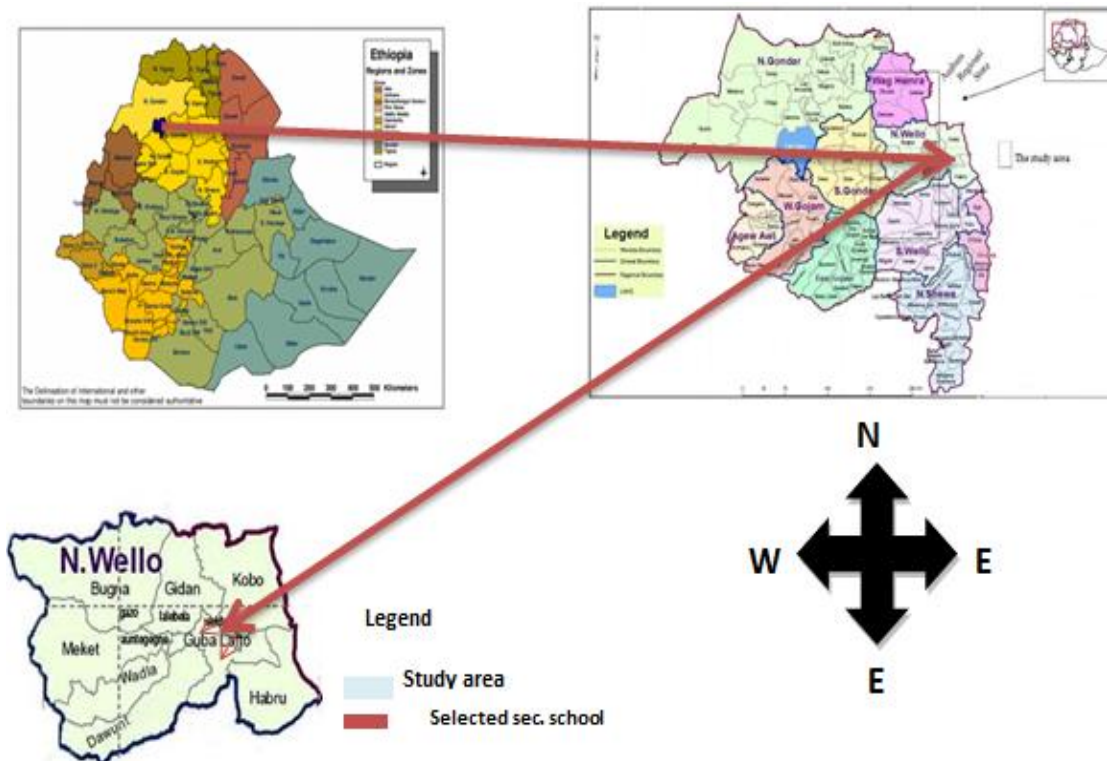


Figure 1 Map of the study area

Source: Merssa Administration office (2022)

3.2 Research Design

Experimental research design was employed with quantitative approach practically testing the selected population with field test. The subjects were engaged in designed program physical exercise for 12 weeks with moderate exercise for 3 days per week (Saturday, Tuesday and Thursday) for 60 minutes per day. The following is the symbolic representation of the design.

Table 1 Study design

Intervention	Exercise Training
Frequency	3 days/week
Amount of training	3 month
Time	60'/session
Intensity	Moderate
Exercise days/week	Saturday, Tuesday and Thursday
Time of training	2:00-3:00 pm

3.3 Research Method

The study design was experimental and used quantitative research method. This method was selected because it helps to be accurate and provide complete description of the comparison of the study method.

3.4 Population and Sampling Techniques

The study was conducted in North Wello Zone, Merssa Secondary school, since the research is experimental to monitor the practice in training as well as manage in test administrations thirty three sample students, who were taken purposively from a total population of 215 grade 11 students. Grade 11th students were purposively selected for they were much eager to perform the physical education task compared to other students.

3.5 Source of Data Collection

The study was based on data obtained from primary sources and secondary sources. Primary data were collected from the field test results of pre and posttest of all groups. Secondary data were obtained from norms, techniques, rules of test and other supportive materials from internet, journals, and books in order to enforce the data analysis.

3.6. Data Collection Instruments

To get reliable information from the study participants, the types of instruments used have paramount significance. Thus, pre and post selected health related fitness component skill tests namely nine minute test for CRF, ninety degree pushup test for muscular endurance, trunk lift test for muscular strength, set and rich test for flexibility, and BMI for body composition were identified as important tools of the study.

3.6.1 12 Minute Run test

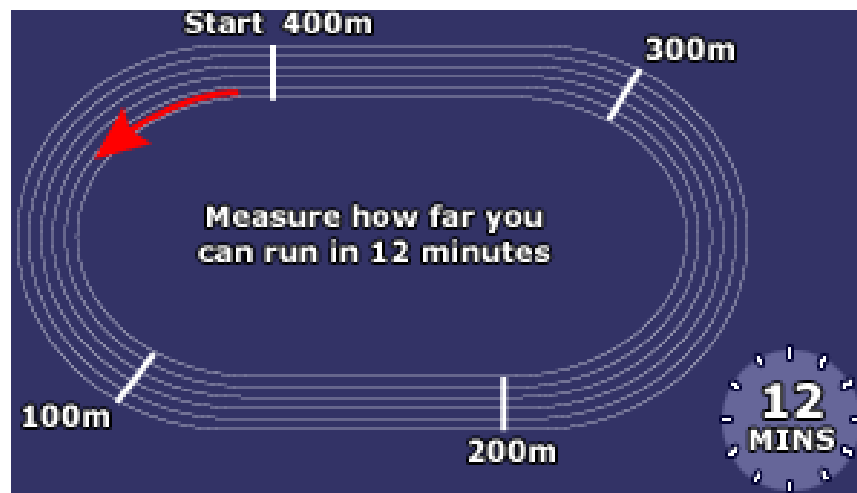


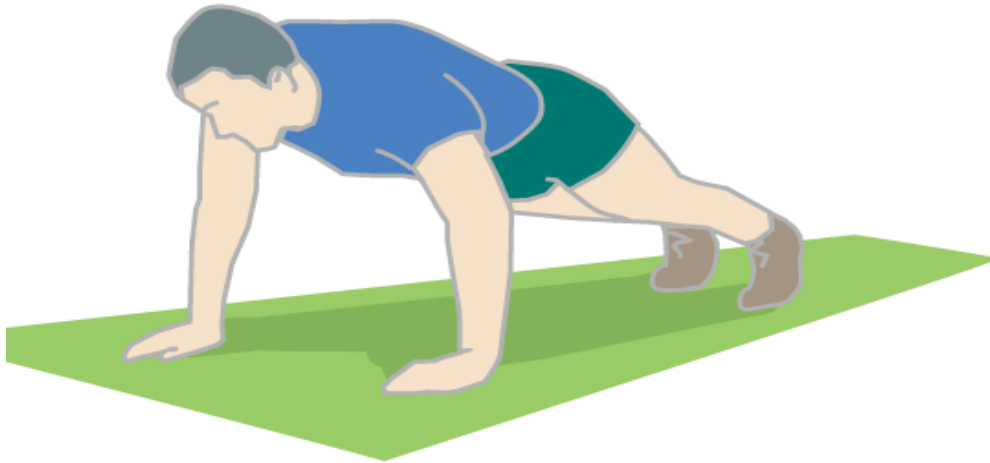
Figure 2 Twelve minute run test track

Source: Adopted from Mackenzie

The test measured the CVE of the participants. All the participants were asked to run in marked area for 12 minutes. The distance covered in 12 minutes was recorded as his/her score. The performers were told in advance about the advantage of maintaining a constancy pace. The runners were motivated to give their best. The standard was used for its relevance to collect the data in issues related to the study. The unit is meter per second.

<https://www.topendsports.com/testing/norms/cooper-12minute.htm>

3.6.2 Ninety degree Push-Up



Figur.3 90° push-up

Adopted from Mackenzie

To measure the muscular endurance the ninety degree push-up test was given to the participants. The subject were being tested on prone lying position putting their palms at the shoulder level on the ground, face-down on the mat. On the signal “go” they were asked to raise their body upward until the arms fully extended, then lowered until the elbows bend at 90 degrees. These constituted of one repetition of a pushup and were count as one. To do this, the participants were asked to kneel on the floor, hands on either side of the chest and keep back straight. The scoring were the number of pushups the participants can do until exhaustion. The measurement unit is number in minutes.

(<https://www.topendsports.com/testing/tests/home-pushup.htm>)

3.6.3 Trunk lift test

Trunk lift is one of the tests to measure student’s upper back and neck muscular strength. The test was performed by prone lying position (face down) straight on the ground, place the hands under the thighs or hands clasped behind the neck and then slowly raise the head and chest from the floor by arching the upper back. The distance from the tip of nose to the mat using ruler was taken as his/her score. The measurement unit is number in minutes.

(<https://www.topendsports.com/testing/tests/home-trunklift.htm>)

3.6.4 Sit and Reach Test

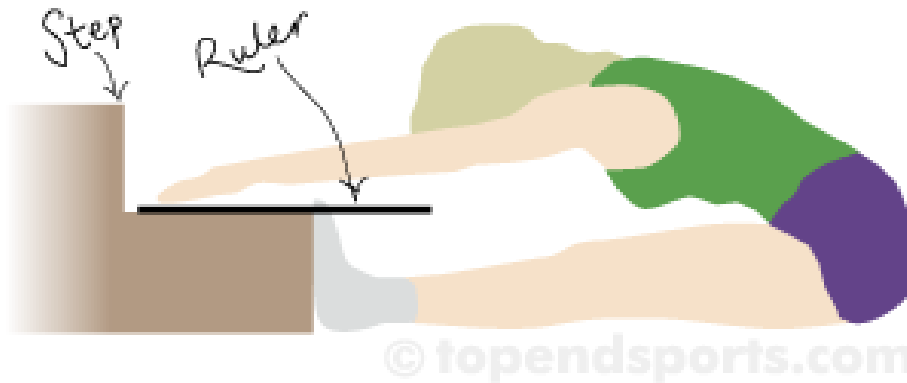


Figure 4 - Sit and Reach Training Drill

Source: <http://www.topendsports.com>

The test measured the flexibility of the participants'. The subjects were asked to sit comfortably on the floor without shoes, legs extended, and feet flat against the sit and reach apparatus. The participants was placed the hand on top of the other hand. On the signal, the students gradually reached forward as far as possible and hold her/his position until the test administrator placed a marker at the end of the student's fingertips. Students were permitted three admitted consecutive attempts to push the marker further. The farthest point reached in the three attempts was recorded to the nearest centimeter.

(<http://www.topendsports.com/testing/tests/sit-and-reach.htm>.)

3.6.5 Body Mass Index (BMI)

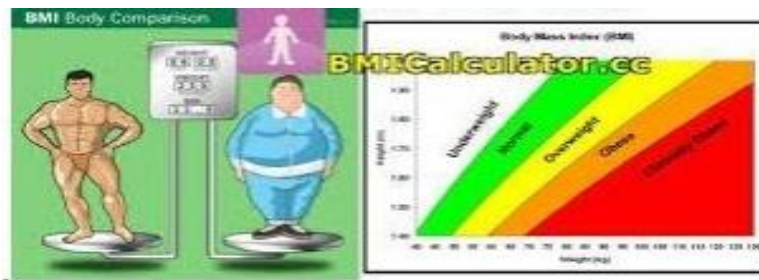


Figure 5 Body mass index test

Adopted from Mackenzie

The participant's body weights, in kilograms (kg) and Body height in meters (m) was measured using a precision tape which is part of the balance beam. During the measurement, participants

were asked to stand upright, with feet together, knees straight, heels, buttocks and back touching the back part of the height measuring apparatus and the cross bar indicating the height were made perpendicular to scale and exactly on the head of the particular person whose height will be measured. The ratio of body weight in kg and height in meter squared will be taken to calculate the BMI. Then it was calculated with following formula (Marchese, 2005).

$$\text{Body mass index} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

3.7 Variables of the Study

Variables of the study were including the health related physical fitness components (dependent) and the respective selected physical exercise as independent variable. These variables were included in the field test.

Table 2 Major variables of the study

Dependent variables	Independent variables
CRE	Selected physical exercise
MS	
ME	
Flexibility	
Body composition	

3.8 Data Collection Procedures

The sampled students were tested before starting the treatment. The researcher took pretest on selected health related components tests for all. Then, the selected students got treatment for 12 weeks for 3 times per week for 12 weeks. After treatment, the researcher took post test results for each participant on health related components.

3.9 Data Analysis

The raw data which were collected from pretest and posttest were organized and structured systematically. Then quantitative data analysis method was employed using SPSS software version 20 in accordance with the study's overall goal.

3.10 Ethical Consideration

Before data collection was carried out, ethical issues were taken into consideration. The participants were asked for their consent to participate and the purpose of the study was made clear and understandable for all.

Chapter four

4. DATA EVALUATION AND RESULTS

4.1 Data display

Four demographic variables of the respondents were gathered as background information. These include gender, age, and grade was summarized in the following table.

Table 3 Characteristic of Study Participants

NO.	Variable	Category	Frequency	Percentage
1	Gender	Male	33	100
		Total	33	100
2	Age	15-16	3	9.1
		17-18	19	57.6
		19-20	8	24.2
		Above 20	3	9.1
		Total	33	100
3	Grade	11	33	100
		Total	33	100

As indicated in Table 3, 33 (100%) of the study participants were males. The result indicated that all participants for the study were males. Regarding to the ages of respondents, 19 (57.6 %) were at the age of 17 and 18 years, and 8 (24.2%) were at the age of 19 and 20.

4.1.1 Paired t-test results and discussions

Table 4 Paired sample statistics of 12 minute run test

Types of test	Number of samples	Pre-test		Post-test		Indicates	In favour
		Mean	SD	Mean	SD		
12 m test	33	2780.0	281.1	2886.1	220.1	Change	Post

Table 4 showed that the pre-test score of the group of the 12 minutes run test. The mean value indicates 2780.0 with a SD of 281.1. The same table indicated the average post-test score of the group was 12 minute post-test result mean value is 2886.1 with SD of 220.1. From the data we can see that post test result of the group is greater than pre-test results of experimental group in the studied skill.

Table 5 Paired sample statistics of ninety degree push-up test

Types of test	Sample	Pre-test		Post-test		Indicates	In favour
		Mean	SD	Mean	SD		
Ninety degree push up test	33	19.4	6.1	26.4	6.0	Change	Post

The paired sample statistics in Table 5 showed that the pretest score of the ninety degree push-up test mean value of 19.4 with a SD of 6.1. The same table indicated the average post test score of the same ninety degree push-up post-test result mean value is 26.4 with SD of 6.0. From the data we can see that post test result of the group being greater than pre-test results of pretest results of the studied skills.

Table 6 Paired sample statistics of Trunk lift test

Types of test	Number of sample	Pre test		Post test		Indicates	In favour
		Mean	SD	Mean	SD		
Trunk lift test	33	37.30	4.27	41.68	3.34	Change	Post

Table 6 indicated that the pretest score of the Trunk lift test mean value of 37.30 with a SD of 4.27. The same table indicated the average post test score of the group. The Trunk lift test post-test result mean value is 41.68 with SD of 3.34. From the data we can see that post test result of group being greater than pre-test results of the group in the studied skill.

Table 7 Paired sample statistics of sit and reach test

Types of test	Number of sample	Pre-test		Post-test		Indicates	In favour
		Mean	SD	Mean	SD		
sit and reach test	33	.90	4.17	4.2	3.93	Change	Post
	33	1.30	2.94	3.3	3.05	Change	Post

Table 7 showed that the pretest score of sample on the sit and reach test, whose mean value is 0.90 with SD of 4.17. The same table indicated the average post test score of the group. The sit and reach test on the post-test result mean value is 4.2 with SD of 3.93. From the data we can see that post test result of the sample group is greater than pre-test results of it in studied skill.

Table 8 Paired sample statistics of BMI

Types of test	N	Pre test		Post test		Indicates	In favour
		Mean	SD	Mean	SD		
Body mass index	33	19.92	1.2	19.14	1.05	Change	Post

Table 8 showed that the pretest score of the sample group on BMI test mean value of 19.92 with a SD of 1.2. The same table indicated the average post test score of the group. The BMI test post-test result mean value is 19.14 with SD of 1.05. From the data, we can see that post- test result of the group is greater than the pre-test results of the group in the studied skill. Results showed that there was mean difference between the pre and post-tests in all studied skills.

4.3 Comparison of Paired t-test

Table 9. Comparison between Pre and Post- measurement Results for the Group (pair t-test)

Tests	Difference	Paired Differences			“t”	Df.	Sig (p value)
		Mean	S.td	SE. mean			
12minute run test	post - pre-test	106.0	134.2	42.4	2.49	32	.004
90° push-up test	post - pre-test	6.95	4.13	.924	5.01	32	.001
Trunk lift test	post - pre-test	4.38	2.602	.582	2.237	32	.000
Sit and reach test	post - pre-test	3.30	.948	.300	11.0	32	.000
BMI test	post - pre-test	.753	.470	.492	6.203	32	.000

Table 9, indicated that the statistical significance analysis between pre and post-tests of all independent group. Table 9: showed that there was statistically significant difference between the pretest & posttest scores in the group. All studied health related physical fitness component test result because the mean difference of 12 minute run test score=106.0 & p=0.004, , ninety degree push-up test score mean difference= 6.95& p=0.001, trunk lift test score mean difference=4.38& p=0.000, sit and reach test score mean difference=3.30& p=0.000 and BMI test score mean=0.753& p=0.000. In all studied skill (p<0.05).This indicated that EG had increase emends in favor of post-treatment than pre-test in all studied health related components. The result indicated that physical exercise has positive impact (significant difference) on the developments of students’ health related components.

The finding, using physical exercise has positive impact on the improvement of students’ CVE, MS, ME, flexibility and body composition is goes with results of Mathewos, (2013), Williams, et al. (2008) and Mahendran (2009).

Chapter five

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Investigating the impact of physical activity on health-related fitness components in the context of Merssa secondary schools in the North Wello Zone, Amhara regional State, was the aim of this study. The researcher used the experimental method by adapting the pre and post measurement design of a single group. The research sample was composed of 33 students selected purposively from 215 total populations. Then, group was made pass through an experimental treatment

To address the research objectives the following research questions were raised:

- ✓ What effect does exercise have on increasing cardio-respiratory endurance of Merssa secondary school?
- ✓ What effect does exercise have on increasing muscle strength, endurance, and flexibility in Merssa secondary school?
- ✓ What effect does exercise have on improving one's body composition in Merssa secondary school?

The data collected from the samples were presented and analysed quantitatively and discussed based on research questions. The experiment was conducted pre-test on January 12, 2023, and after intervention the post-test was conducted on April 21, 2023 making the testing condition the same in its organization. Accordingly, the data obtained from the sample students through the pre-test and post-test were tabulated and analysed using SPSS software version 20.

From the overall analysis of the data obtained from different test results, the following major findings have been found and the research questions were answered.

The study revealed that there was a mean difference between pre-test and post-test scores in the group in all studied HRPF test results in 12 minute run, 90⁰ push-up, trunk lift, sit and reach and body mass index test result had 2780.0, 19.4, 37.30, 0.90 & 19.92 results of mean for pre-test and 2886.1, 26.4, 41.68, 4.2 & 19.14 for post-test respectively and the level of significance set at 0.05. The selected fundamental health related component skills of the pre and post test score difference of mean value was 106.0 & 6.95, 4.38, 3.30 & 0.753 and p value 0.004, 0.001, 0.000,

0.000 and 0.000 respectively. This indicates that the physical exercise has positive impacts on the development of HRPF components.

Based on the above result the comparison between group's mean results in all studied HRPF components test result had p value ($p > 0.05$) for all studied skills. This indicated that there is statistical mean difference between groups in all studied health related physical fitness components. This indicated that physical exercise has positive impact on PF components improvement.

5.2 Conclusions

Based on the findings of the study, the research concluded that exercise has a beneficial effect on CRF improvement, getting physical exercise helps to improve muscular endurance, Exercise on a physical level is beneficial for improving MS, Exercise that involves physical activity helps to improve flexibility. Exercise that involves physical activity improves body composition and In general, students' HRPF components improve when the students engage in physical exercise.

5.3 Recommendations

The findings and conclusions made led to the following recommendations.

1. It is important for physical education teachers to inform their students about the purpose and goals of the subject.
2. Exercises that involve physical activity improved respiratory and cardiovascular fitness. Therefore, students should engage in aerobic exercise for better improvement.
3. PE teachers should promote physical exercise among students in different classes and grade levels in order to improve their PF status.
4. The curriculum developers should integrate and promote physical exercise activities into physical education classes in schools.
5. PE educators ought to exert their efforts in promoting the significance of physical exercise training, given its manifold advantages.
6. More research ought to be carried out in various educational institutions to comprehend the impact of physical activity on HRPF elements.

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APPENDIX A.: Pre and post results of Sample Group

No	Name of student	Sex	12 minute run (meter in minute)		Difference
			Pre	Po	
1	A	M	2800	2910	
2	B	M	3000	3100	
3	C	M	2400	2600	
4	D	M	2950	2900	
5	E	M	2500	2900	
6	F	M	2300	2400	
7	G	M	2700	2700	
8	H	M	2900	3050	
9	I	M	2800	2950	
10	J	M	2350	2500	
11	K	M	2600	2700	
12	L	M	3100	3050	
13	M	M	3100	3150	
14	N	M	2650	2730	
15	O	M	2900	3000	
16	P	M	2312	2516	
17	Q	M	2411	2617	
18	R	M	2510	2717	
19	S	M	2612	2818	
20	T	M	2709	3017	
21	U	M	2808	3015	
22	V	M	2310	2616	
23	W	M	2050	2100	
24	X	M	3100	3000	
25	Y	M	2501	2510	
26	Z	M	2252	2220	
27	A	M	2803	2930	
28	B	M	2504	2540	
29	C	M	2705	2750	
30	D	M	3106	3060	
31	E	M	3207	3170	
32	F	M	2708	2780	
33	G	M	2409	2490	

APPENDIX B: Pre and post results of Sample Group of 90° Push-Up

No	Name of student	Sex	90° push-up		
			Pre	Po	difference
1	A	M	11.17	8.12	
2	B	M	12.00	8.87	
3	C	M	12.5	9.00	
4	D	M	11.87	8.23	
5	E	M	11.67	8.12	
6	F	M	12.00	8.76	
7	G	M	12.21	8.32	
8	H	M	11.98	8.00	
9	I	M	11.60	8.45	
10	J	M	11.88	8.02	
11	K	M	10.99	8.06	
12	L	M	12.34	9.00	
13	M	M	12.01	9.41	
14	N	M	11.81	8.08	
15	O	M	11.21	8.59	
16	P	M	11.27	8.28	
17	Q	M	11.37	8.17	
18	R	M	12.20	8.77	
19	S	M	12.01	8.36	
20	T	M	11.88	8.05	
21	U	M	11.60	8.46	
22	V	M	11.88	8.12	
23	W	M	11.19	8.12	
24	X	M	12.08	8.87	
25	Y	M	12.50	9.00	
26	Z	M	11.87	8.23	
27	A	M	11.67	8.12	
28	B	M	12.06	8.76	
29	C	M	12.23	8.32	
30	D	M	11.98	8.00	
31	E	M	11.60	8.45	
32	F	M	11.88	8.02	
33	G	M	10.99	8.06	

APPENDIX C: Pre and post results of Sample Group of Trunk Lift

No	Name of student	Sex	Trunk lift		Difference (Cent Met)	
			Pre	Po		
1	A	M	10	17	7	
2	B	M	12	19	7	
3	C	M	11	18		
4	D	M	9	15	6	
5	E	M	12	17	5	
6	F	M	13	18		
7	G	M	8	15		
8	H	M	10	17		
9	I	M	9	17		
10	J	M	10	18		
11	K	M	13	18		
12	L	M	11	17		
13	M	M	15	20		
14	N	M	11	18		
15	O	M	14	19		
16	P	M	9	15		
17	Q	M	12	17		
18	R	M	13	18		
19	S	M	8	15		
20	T	M	10	17		
21	U	M	9	17		
22	V	M	10	18		
23	W	M	10	17		
24	X	M	12	19		
25	Y	M	11	18		
26	Z	M	9	15		
27	A	M	12	17		
28	B	M	13	18		
29	C	M	8	15		
30	D	M	10	17		
31	E	M	9	17		
32	F	M	10	17		
33	G	M	13	19		

Appendix d: pre and post results of sample group of Sit and Reach

No	Name of student	Sex	Sit and reach		Difference (cent. Meter)
			Pre	Po	
1	A	M	+4	+6	
2	B	M	-2	+2	
3	C	M	-1	+3	
4	D	M	-3	1	
5	E	M	+5	+10	
6	F	M	+4	+7	
7	G	M	-1	+2	
8	H	M	0	+3	
9	I	M	-2	0	
10	J	M	0	+3	
11	K	M	0	+5	
12	L	M	-3	0	
13	M	M	+10	+12	
14	N	M	+2	+6	
15	O	M	-2	+3	
16	P	M	-3	1	
17	Q	M	+5	+10	
18	R	M	+4	+7	
19	S	M	-1	+2	
20	T	M	0	+3	
21	U	M	-2	0	
22	V	M	0	+3	
23	W	M	+4	+6	
24	X	M	-2	+2	
25	Y	M	-1	+3	
26	Z	M	-3	1	
27	A	M	+5	+10	
28	B	M	+4	+7	
29	C	M	-1	+2	
30	D	M	0	+3	
31	E	M	-2	0	
32	F	M	0	+3	
33	G	M	0	+5	

Appendix d: pre and post results of sample group of Sit and Reach

Appendix E: pre and post results of sample group of Body Mass Index

No	Name of student	Sex	BMI		
			Pre	Po	Difference (w/h2)
1	A	M	22	20.99	
2	B	M	22	21.3	
3	C	M	19.1	18.5	
4	D	M	21.5	20.2	
5	E	M	18.4	18.1	
6	F	M	18.7	18.3	
7	G	M	19.1	18.6	
8	H	M	20	18	
9	I	M	21.2	20.2	
10	J	M	19.1	18.6	
11	K	M	19.3	18.7	
12	L	M	19.4	18.9	
13	M	M	19.6	19.5	
14	N	M	19.8	19.1	
15	O	M	19.3	18.0	
16	P	M	21.5	20.1	
17	Q	M	18.4	18.2	
18	R	M	18.7	18.3	
19	S	M	19.1	18.4	
20	T	M	20	15	
21	U	M	21.2	26.2	
22	V	M	19.1	17.6	
23	W	M	22	20.9	
24	X	M	22	21.3	
25	Y	M	19.1	18.5	
26	Z	M	21.5	20.2	
27	A	M	18.4	18.1	
28	B	M	18.7	18.3	
29	C	M	19.1	18.6	
30	D	M	20	18	
31	E	M	21.2	20.2	
32	F	M	19.1	18.6	
33	G	M	19.3	18.7	

APPENDIX F

Selected skill test and descriptive characteristics of the study participants

No	Specifications	Type of Test	Measurement
1	CRF	12' test	Distance
2	Muscular strength	Ninety degree push up	Count
3	Muscular endurance	Trunk lift	Second
4	Flexibility	Sit and reach test	Count
5	Body composition	BMI	Ratio

APPENDIX- G

Twelve-week training program for experimental groups

Interventions; physical exercise

Year: 2023 **Duration:** 12 weeks **training place:** Merssa secondary school

Exercise	Duration	Frequency	Intensity	Objectives	Target pint
<p><u>Warming-up</u></p> <ul style="list-style-type: none"> • Walking • Jogging • Stretching 	10' in each session	Once	Low To moderate	-To warm the body -To introduce body for main activity	The whole-body parts
<p><u>Main part</u></p> <ul style="list-style-type: none"> • 12 minute run test and related exercise 	9- Class	Rope jump, step up, 50m run	Moderate to high	To improve Cardio vascular endurance	CRE
<ul style="list-style-type: none"> • Ninety degree push up • Trunk lift 	9- class	Different push activity	Moderate to high	To improve Students MS	MS and ME

<ul style="list-style-type: none"> • Sit and reach 	9- class	Perform different flexibility activity	Moderate to high	To improve flexibility	flexibility
<ul style="list-style-type: none"> • BMI 	9- class	Perform stable activity	Moderate to high	To develop Body shape	BMI
<p><u>Cooling- down</u></p> <ul style="list-style-type: none"> • Jogging • Walking • Stretching 	5-10 minutes / a session	Once	Low to very low	Returning the body to normal position	To whole body parts

APPENDIX- H

One session Training Program for the Sample Group

Day	Duration	Class	sets &repetition	Intensity
Monday	10'	<p><i>Warming up exercise</i> -prepare body for main activity</p>		Moderate
	40'	<p><i>Main part</i> <u>CVE</u> -rope jump -step up -12 minute run</p>	<p>-3X3 minute -3X20m -3X15m -3X20 minute -3X20 minute</p>	High
	10'	<p><i>Cooling down</i> -perform recovery activity</p>		Low