**COURSE GUIDE**

# KHE 415
# ADULT FITNESS PROGRAMME

**Course Team** Dr. A. S. Na 'Allah (Course Writer) -
Federal University Dutsin – Ma.
Prof. C. E. Dikki (Course Editor) – ABU
Dr. Agnes A. Kolawole (Programme Leader) –
NOUN

**NATIONAL OPEN UNIVERSITY OF NIGERIA**

National Open University of Nigeria
Headquarters
University Village
Plot 91, Cadastral Zone
NnamdiAzikiwe Expressway
Jabi, Abuja

Lagos Office
14/16 Ahmadu Bello Way
Victoria Island, Lagos

e-mail: centralinfo@nou.edu.ng
URL: www.nou.edu.ng



Printed 2021

ISBN: 978-978-058-301-9

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# INTRODUCTION

KHE 415: Adult Fitness Programme is a two (2) credit unit course available to all students offering Bachelor of Science (BSc.) in Human Kinetics and Health Education. Human Kinetics is increasingly being accepted as an integral part of general area of attaining Physical fitness level among adults especially in developing countries Nigeria inclusive. The course is broken into four modules and 13 study units. It introduces the students to the brief history of Physical fitness. It also educates the students on the concept of physical fitness. The course further exposes the students to the components of physical fitness. At the end of this course, it is expected that students should be able to understand, explain and be adequately equipped on the area of physical fitness.

Since the beginning of time, people have found ways to stay fit. Fitness, as we know it today, seems to be a relatively modern invention – something that started vaguely in the 70s with jogging. However, physical exercise obviously goes back much further than that, to a time where people wouldn't have thought of it as working out, but rather a way of life. Centuries and millennia years ago, they did not have all the machines and weights and gyms that we have today, and yet they were in better shape than we are. To understand why this is, how we got to our modern fitness culture, and what we have lost along the way, it's helpful to take a look at the history of exercise in general.

Between 4,000 BC and the fall of the Roman Empire in 476 AD, civilisations rose and fell through war and conquest. Assyrians, Babylonians, Egyptians, Persians, and later on, the Greeks and Romans all imposed physical training on boys and young men. The purpose is preparing for battle. Ancient military training had similarities to the movements performed in nature by our cavemen brethren, but with more structure and a different end goal. Young men practiced fundamental skills such as walking and running on uneven terrains, jumping, crawling, climbing, lifting and carrying heavy things, throwing and catching, unarmed fighting, and weapons training.

Outside of military training and sports, Greeks, and later the Romans, celebrated the body's beauty and strength and embraced physical training as a philosophical ideal and an essential part of a complete education. They celebrated the idea of having a sound mind, in a sound body. Physical culture started to rise beyond practical necessities to become a means to an end — an "art de vivre."

Approximately 16 years later, Mercurialis, an Italian physician, published De Arte Gymnastica. It was the culmination of his studies of classical and medical literature, particularly the ancient Greeks' and Romans' approach to hygiene, diet, and exercise, and their use of natural methods for the treatment of disease. Laying out the principles of physical therapy for the first time, and accompanied with beautiful illustrations (even though they were largely creative speculations), it is considered the first book on sports medicine, and strongly influenced the wave of physical education and training methods that started to emerge in Europe two centuries later.

The Industrial Revolution, marking the transition from manual production methods to machine-based manufacturing processes, began around 1760 and quickly generated social, economic, and cultural trends that changed the way people lived, worked, and of course, moved. As people became more sedentary, a new movement towards intentional physical exercise arose. This movement was given a boost in the 19th century from the rise of a nationalistic fervor in many counties in Europe. Staying healthy, fit, and ready to serve in battle became a point of civic duty and pride.
Exercise and games, they include wrestling, running, riding, fencing, vaulting, and dancing. Even the school's uniforms which were often heavy and constricting during this time, were made more comfortable to allow students greater freedom of movement. This model inspired the founding of many similar institutions, and physical training began to become more systemised and included as an integral part of the educational curriculum.

Twenty years later, Guts Muths, another German teacher and educator, developed the basic principles of artistic gymnastics, for which he is regarded as the "Great Grandfather of Gymnastics." His Gymnastik für die Jugend (Gymnastics for the Youth), the first systematic textbook in gymnastics, was published in 1800 and became a standard reference for physical education in the English-speaking world.

In 1810, Friedrich Jahn came on the physical culture scene. Known as "The Father of Gymnastics," he was an essential pioneer of physical education, and his ideas spread throughout Europe and America. A German gymnastics educator and ardent nationalist who had lived through Napoleon's invasion of his country, he felt the best way to prevent another such incursion were to help his people develop their bodies and minds. To this end, he led young men on fresh-air expeditions and taught them gymnastics and calisthenics to restore their physical and moral strength.

In addition to these contributions to physical culture, Jahn invented the pommel horse and horizontal and parallel bars, and promoted the use of gymnastic rings. The physical culture festivals he sponsored attracted as many as 30,000 enthusiasts, but the essence and end goal of his gymnastics and calisthenics methods were above all practical and functional, not artistic. He advocated the practice of the traditional natural movements like running, balancing, jumping, and climbing, and so on.

In Sweden, Swedish gymnastics had four categories: pedagogic, military, medical, and aesthetic. All movements had to be performed correctly and collectively in a freestanding fashion under a leader's direction, which differed from the predominant, more mobile, strenuous, and practical German approach. Aspects of this method can still be traced in some modern programs of physical training.

In 1847, French physical culture pioneer and strongman Hippolyte Trait founded a huge gymnasium in Paris where the bourgeois, aristocrats, and spirited youth joined in an enthusiastic pursuit of fitness.

In the 1870s after the loss of Alsace-Lorraine to the Germans, the already budding nationalistic mood in France exploded. Physical education became a principal focus in French schools, as battalions of young men were trained to avenge the country.

In Scotland, the Highland Games began during the Romantic trend of the 1830s, and included traditional physical challenges distinctive to Scottish culture such as caber tossing, hammer throwing, and the stone shot put, along with running, wrestling, and jumping.

In general, during the prehistoric era, men spent a big portion of their time hunting. Unlike today, prehistoric man did not have total access to rifles and shotguns. In fact, their hunting gear was limited to spears and complex techniques. It required a lot of strength and endurance to bring down small and large prey. This is why fitness was so important to primitive man. He relied on his fitness to survive. In fact, any man who lacked fitness did not survive in the prehistoric era. Those who were in poor physical health did not survive, because they did not have the strength or endurance to endure the long hunting expeditions required to gather food. These journeys would last anywhere from one to two days or even longer, depending on the villages' food and water needs. Dancing was an important activity in the prehistoric era. Both women and men took part in dances that could last for several hours. Fitness

played a major role in partaking in these events. Those who lacked fitness would watch others enjoy the activities.

Celebrations was part of the life of the primitive man, he celebrated almost anything from successful hunting expeditions to births. A common way of celebrating during this era was spending time with friends and family members of neighbouring tribes. These trips brought a lot of enjoyment, but for those involved in the trips, they were gruesome. However, the rewards were definitely worth all the effort. Visiting neighbouring tribes during this period required a six to 20-mile journey on foot. These trips required a high level of fitness, which was a quality that primitive man took very seriously. Today, humans have far more convenient ways to travel. They can utilise automobiles, planes and trains. In the 21st Century, hunting and fishing areas no longer a requirement for survival. Foods are available on just about every corner, in grocery stores and restaurant. This brings up the question of the importance of fitness in the modern world.

## COURSE AIM

The overall aim of this course, KHE 415, is to introduce students to the variables associated with attainment of physical fitness for total body health. During this course, you will learn about the areas of physical fitness in broad perspectives: ranging from theoretical perspectives on the physical fitness and its components; concept of physical fitness; classifications of the components under health related and skills/performance related.

## COURSE OBJECTIVES

Each unit has specific objectives to guide you into the purpose of the study. You should read the objectives before you begin the study and ask yourself whether the objectives have been met after you are through with each unit.

However, below are the overall objectives of this course. On successful completion of this course, you should be able to:

- Briefly state the history of physical fitness
- Define the term physical fitness and is concept
- Identify the classifications into health and performance related
- List the principles of physical fitness
- Explain the procedure for individual exercise prescription
- Prescribe exercise programme
- Explain Components of exercise prescriptions
- Select exercise programme

- Define cardio respiratory fitness
- Define muscular endurance
- Define muscular strength
- Discuss other components of performance related such as speed, power, balance, agility, reaction time
- Define physical fitness programme
- Discuss procedure for individual physical fitness programme.

## WORKING THROUGH THE COURSE

To satisfactorily complete this course, you are expected to read the study units, read recommended textbooks and other materials provided by the National Open University of Nigeria (NOUN). Most of the units contain exercise tagged ―Tutor-Marked Assignment‖. At a point in the course, you are required to submit these assignments for assessment prior to the real examination. Stated below are the components of the course and what you are expected to do.

## STUDY UNITS

There are 15 study units in this course divided into four Modules. The modules and units are presented as follows;

**Module 1 Brief History and Development of Physical Fitness**

Unit 1 Briefly State the History and Development of Physical Fitness
Unit 2 Discuss the Concept of Physical Fitness Programme
Unit 3 Define Physical Fitness Profile
Unit 4 List the Principles of Fitness Programme Development

**Module 2**

Unit 1 Components of Physical Fitness
Unit 2 Cardio Respiratory Fitness
Unit 3 Muscular Strength and Endurance
Unit 4 Develop of Physical Fitness Component

**Module 3 Physical Fitness Programme**

Unit 1 Definition of Physical Fitness Programme
Unit 2 Procedure for Physical Fitness Programme
Unit 3 Classification of Individuals Physical Fitness Status

**Module 4 Prescribing Exercises Programmes**

Unit 1 Prescribing Exercise Programme
Unit 2 Components of an Exercise Session
Unit 3 Selection of an Exercise Programme
Unit 4 Modes of Exercises

## REFERENCES/FURTHER READING

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American College of Sports Medicine Guide lines for Exercise testing and Prescription (3rd ed,). (1986). Leas and Febiger, Philadelphia, P. A.

Morse, R. L. (1974). Exercise and the Heart: Guidelines for Exercise Programs Charles C. Thomas Publisher, Spring field U. S. A. 1974, Taylor and Francis Inc.

Williams, M. H. (2005). Nutrition for fitness and Sports. W. M. C. Brown Company Publishers Dubuque, Lowa, Mc Ardle, W. D. Katch, F. I. Katch V. L. Exercise Physiology: Energy , Nutrition, and Human Performance (2nd ed.) Lea and Febiger, Philadelpha, P. A.

## PRESENTATION SCHEDULE

The course materials possess essential dates for timely and urgent completion and submission of the student's TMA and regular attendance to tutorials. It is important to note that you are expected to submit all your assignments by the agreed date and time. Efforts should be made to avoid in ability to meet up with your work.

## ASSESSMENT

There are two aspects of the assessment of the course. Firstly, the tutor marked assessment and secondly, there will be a written examination (final). In dealing with the assignments, you are expected to apply information, knowledge and strategies gathered during the course. The tutor marked assignments are expected to be submitted online in accordance with the directives of the university.

## HOW TO GET THE MOST FROM THE COURSE

The course material provides you with the opportunity of reading and learning at each student's pace, time and location. To get the best of experience, you will need to work the material in the following logical order.

1. Read each unit step by step as arranged.
2. As you read through the material for each unit, note the key points in each unit.
3. Refer to the links and text provided.
4. After reading, attempt the assessment exercise given at each step.
5. You should obey all the rules and guiding instructions.

## FACILITATION

Online facilitation would be made available to provide you with the opportunity to interact with your tutor and your colleagues across the world.

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# MODULE 1 HISTORY AND DEVELOPMENT OF PHYSICAL FITNESS.

Unit 1 Briefly State the History and Development of Physical Fitness
Unit 2 Discuss the Concept of Physical Fitness Programme
Unit 3 Define Physical Fitness Profile
Unit 4 List the Principles of Fitness Programme Development

## UNIT 1 BRIEF HISTORY AND DEVELOPMENT OF PHYSICAL FITNESS

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3.1 History and Development of Physical Fitness
4.0 Conclusion
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## 1.0 INTRODUCTION

Primitive man relied on their fitness to survive. In fact, any man who lacked fitness did not survive in the prehistoric era. Those who were in poor physical health did not survive, because they did not have the strength or endurance to endure the long hunting expeditions required to gather food. These journeys would last anywhere from one to two days or even longer, depending on the villages' food and water needs. In the 21st Century, hunting and fishing are no longer a requirement for survival. Foods are available on just about every corner, in grocery stores and restaurant. This brings up the question of the importance of fitness in the modern world. It is obvious that fitness is paramount to well-being and health. Without adequate physical fitness, man would not have been able to survive back then. Mankind really owes a lot to prehistoric humans and their will to survive. Dancing was an important activity in the prehistoric era. Both women and men took part in dances that could last for several hours. Fitness played a major role in partaking in these events. Those who lacked fitness watch the others enjoy the activities.

Celebrations were part of the life of the primitive man they celebrated anything from successful hunting expeditions to births. A common way

of celebrations during this era was spending time with friends and family members of neighbouring tribes. These trips brought a lot of enjoyment, but for those involved in the trips, they were gruesome. However, the rewards were definitely worth all the effort. Visiting neighbouring tribes during this period required a six to 20-mile journey on foot. These trips required a high level of fitness, which is a quality that primitive man took very seriously. Today, humans have far more convenient ways to travel. They can utilise automobiles, planes and trains, in the past, this was impossible. Instead, they were forced to walk from one location to the next.

The Chinese began to recognise the importance of physical activity sometime between 2500-250 B.C. Physical inactivity was linked to poor health, and organ malfunctions. To encourage more physical activity, Chinese teachers, such as Confucius, included words of encouragement in their teachings. But, this was only the beginning of the Chinese fitness movement. The Chinese developed gymnastics program known as Kong Fu. The program was utilised to encourage regular physical activity, in an effort to combat poor health. Ancient Chinese were also encouraged to participate in other types of physical activities, such as wrestling, fencing, badminton, archery and dancing. Many of which are still utilised today by people around the globe.

The Polish Falcons (1867) had similar aspirations. In addition to physical training and athletic contests, such cultural groups often sponsored national or traditional dances, songs, and language revivals. Everywhere in Europe people seemed to develop a fitness culture rooted in their ethnic or national identity. Physical fitness has always been an important part of life. It is theorised that when people left a hunter-gatherer lifestyle and formed fixed communities based around agriculture that physical fitness levels declined. This is not to say that levels of physical labor decreased but that the type of work undertaken was not necessarily as conducive to a general level of fitness. As such, regimented fitness regimes were either invented or became more common. This was especially the case in classical civilisations such as Ancient Greece and Rome. In Greece, physical fitness was considered to be an essential component of a healthy life and it was the norm for men to frequent a gymnasium. Physical fitness regimes were also considered to be of paramount importance in a nation's ability to train soldiers for an effective military force. Partly for these reasons, organised fitness regimes have been in existence throughout known history and evidence of them can be found in many countries.

At one time, physical fitness was paramount. It was once part of the school system in the United States. Today, fewer schools require physical educations as a part of the curriculum and that is taking a toll on the country at large. Since children are not getting the education

needed to keep them in tiptop shape, fewer s remain fit and thin. Instead, they're eating whatever they wish and gaining too much weight. Physical education is slowly being removed from schools across the nation.

## 2.0 OBJECTIVES

By the end of this unit, you should be able to:

- discuss the historical development of physical fitness
- discuss the concept of physical fitness
- define physical fitness
- list the principles of physical fitness.

## 3.0 MAIN CONTENT

## 3.1 History and Development of Physical Fitness

From the dawn of humankind to around 10,000 BC, men had a constant voice in the back of their head saying, "Run for your life!" Physical development followed a natural path that was determined by the practical demands of life in a wild landscape as well as the vital need to avoid threats and seize opportunities for survival. One's movement demands consisted of locomotion, the manipulation of tools and natural objects (rocks, tree limbs, etc.), and defense. To survive in a harsh environment full of natural and human obstacles and enemies, early man had to know not only how to run, but also walk, balance, jump, crawl, climb, lift, carry, throw and catch things, and fight. We can also safely assume that playful or creative moves like early forms of dancing were performed when bellies were full and predators weren't around.

The strength and mobility of early man was not developed through structured programs, methods, or schedules, but rather was forged by the daily, instinctive, necessity-driven practice of highly practical and adaptable movement skills. Today, the few hunter-gatherer tribes which still exist around the world would have no idea what "primal fitness" or a "caveman workout" is, as this kind of "exercise" remains deeply ingrained in their everyday lives. Fitness as said earlier seems to be a relatively modern invention – something that started vaguely in the 70s with jogging. But physical exercise obviously goes back much further than that, to a time where people wouldn't have thought of it as working out, but rather a way of life. In the early times, they did not have all the machines and weights and gyms that we have today, and yet they were in better shape than we are. Why this? How we got to our modern fitness culture, and what we have lost along the way, makes it important to look into brief history of exercise.

Man's transition from nomadic hunter-gatherer to farmer led to dramatic changes in his physical activity. The numerous demands of growing food and raising cattle meant a lot of chores and a lot of daily labor for farmers. But these tasks were largely repetitive, and required a very limited range of movement. At the same time, the need for performing a variety of complex movements — running, balancing, jumping, crawling, and climbing— greatly diminished. Such movements were rarely performed in a farm environment, or were performed in much simpler ways; for example, climbing a ladder is safer and more constrained and predictable.

Probably the importance of physical fitness to having a healthy lifestyle is not a new concept. However, a high number of cases of physical inactivity among youths and its relation to childhood obesity are of much concern. Regular physical exercise provides a wealth of benefits. It includes improved mental health, lower adiposity, and musculoskeletal health. Furthermore, educational and health professionals have intuitively believed that students that are physically active and fit show better performances in school. That will prove to have a disastrous impact on the country as a whole in the future. The federal government of Nigeria has attempted to offset this problem by incorporating the teaching and learning of Physical Education in both Primary and Secondary Schools, but the attempt has been futile. This is due to nonchalant attitude in the provision of both human and material resources.

## 4.0 CONCLUSION

Regular participation in physical activities improved the level at which the blood vessel supply blood with oxygen to the working muscles. Eg. it improved stroke volume which is the amount of blood that is pumped out by left ventricle chamber of the heart measured in (ml) of blood. It improved or cardiac out which is the volume of blood injected by the heart measured in liters per minutes. Respiration, exercise also improves $VO_2$ max which is the amount of oxygen used by an individual during a Prolong and high intensity exercise measured in (ml of oxygen per kg of blood weight).

Reduction in heart related disorders: Which may lead to the incidence of heart failure because training causes biochemical changes which affect nutrient deposit such as increase cholesterol concentration, and low density lipoprotein in the blood vessels. Training increases concentration of high density lipoprotein (HDL), which helps in carrying away vascular diseases causing deposits from the blood vessels.

Improved fat metabolism is particularly at rest, since the caloric expenditure is increased as a result of regular participation in physical activity. This on a long time effects help to reduce the body fat thus

contributing to the formation of ATP as energy sources. It increases muscular bone strength and ligament tendons enhance the functional condition of the skeletal system. These are very important in movement activities and reduce musculoskeletal injuries.

## 5.0 SUMMARY

The trend in the deterioration of health and increase in the prevalence of diseases can be arrested or at least minimised if people invest at least 30 minutes, three times a week, in moderate-to-vigorous physical activity. Modest health benefits can be gained by this investment, which costs 150 kilocalories (KCL) a day or 1000kcl a week. Such an investment will reduce the risk of coronary heart disease by 50 per cent and the risk of high blood pressure, diabetes and some forms of cancer by 30 percent. To gain these health benefits, every adult should spend 30 minutes or more in moderate-to-vigorous physical activity on most, if possible, all days of the week. The well-established health benefits of physical activity include:

a. Reduced risk of premature death and development of diabetes, high blood pressure and colon cancer.
b. Reduction of blood pressure in people with high blood pressure, and reduction of depression and anxiety.
c. Control of body weight, development of healthy and strong bones, joints and muscles, development of strength and agility in older people that enable them, move better without failing and the promotion of psychological well-being.

Some examples of moderate physical activity are given below. More vigorous activities like running, require less time (about 15 minutes), and less vigorous activities like washing, require more time (about 45 to 60 minutes).

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Briefly state the History and Development of Physical Fitness.
2. Discuss the Concept of Physical Fitness Programme.
3. Define Physical Fitness Profile.
4. List the Principles of Fitness Programme Development

## 7.0 REFERENCES/FURTHER READING

American College of Sport Medicine (1986). Guidelines for Exercise testing and Prescription. (3rd ed.). Leans and Febiger Philadelphia

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# UNIT 2 CONCEPT OF PHYSICAL FITNESS

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3.0 Main Content
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## 1.0 INTRODUCTION

The human body is designed for work. The arrangement of muscle groups, tendons and ligaments allows the arms and legs to move in a wide variety of activities. The brain controls and regulates the distribution of blood, oxygen, and nutrients from the heart and lungs. The different system of the body is in communication with each other through hormonal and nervous pathways to achieve coordination in the performance of an activity. The more these systems are involved the more enjoyable and efficient exercise becomes. Contrary to this, inactivity leads to poor health. An attempt is therefore made in this chapter to discuss the major benefit of exercise training to the human body and also the influence of genetics, gender and age

## 2.0 OBJECTIVES

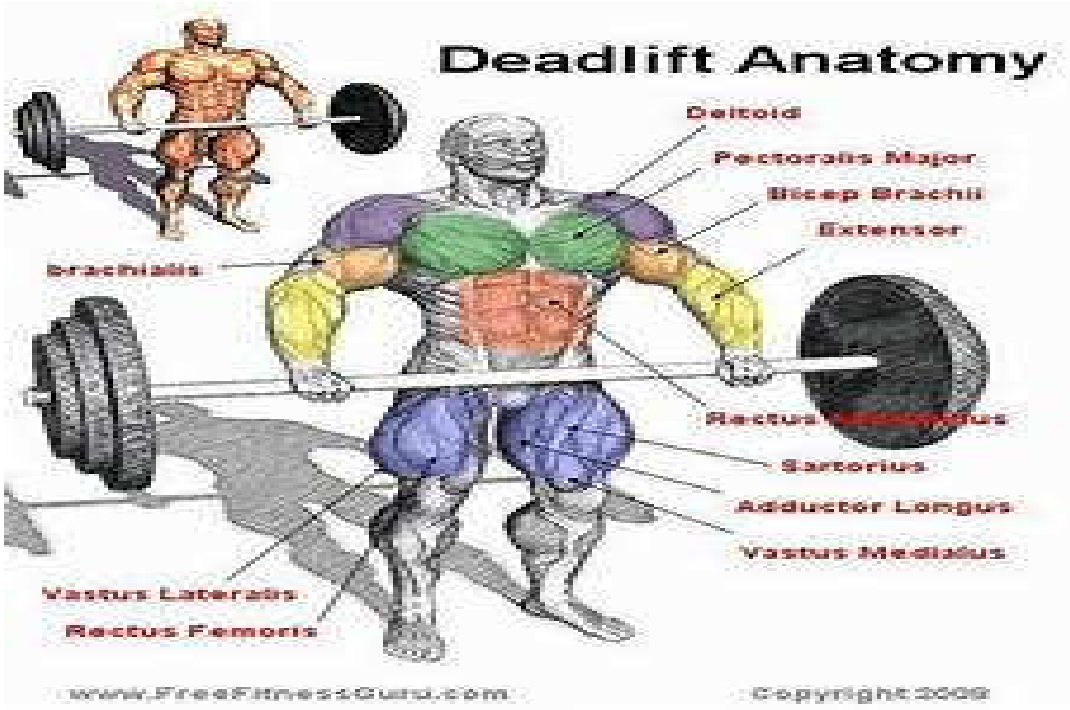
By the end of this unit, you should be able to:

- define physical Fitness
- state the importance of physical fitness

## 3.0 MAIN CONTENT

First of all, in order to achieve physical fitness, one needs to possess adequate aerobic endurance, which is the individual's capability to undergo moderately strenuous activities for a certain length of time. This is only possible if your heart and lungs are strong, working well, supplying enough blood and oxygen throughout the body. Secondly, muscular endurance is yet another crucial component, being your ability to repeat a certain pattern of movements for a specific length of frequency or hold a certain position for a desired time. For example, lifting some weights for a defined number of times will only be possible if the body has this factor of physical fitness well developed.

Naturally, strength is an inevitable part of physical activity and fitness. So, muscular strength, being the ability to exert maximum force, is crucial as well. Keep in mind that different individuals have different muscular strength levels in different parts of their bodies. Either way, lifting something that is as heavy as the body can bear it will depict the level of the person's muscular strength.




Flexibility cannot be left out of this list, since it is your body's power to undergo wide range of motions without causing injuries. It encompasses the joints, muscles and bones. Physical fitness refers to maximum functional capacity of all systems of the body. We are exercising whenever we move and keeping our body tuned and in a good running order. The body of human is framed in such a way that it can jump, climb, bend, stretch and do more tedious work. Finally, there is another component of physical fitness - body composition. This stands for the amount of fat in your body, in proportion to the amount of bones and muscles. Therefore, the athlete needs to pay attention to all the factors of physical fitness and exercise them regularly, through an active life, a healthy diet and a positive lifestyle in general. This is the ticket to a healthy and happy life.

## 4.0 CONCLUSION

The condition in which regular exercise training is stop is called detraining. It cause sudden and significant changes in cardio respiratory fitness and some extend in muscular strength and size. In few weeks of detraining, stroke volume and blood volume decrease, causing a significant decline in cardio respiratory fitness. This situation can be avoided by exercising at an intensity of 70 per cent of Vo2 max. Similarly gain return to prêtraining levels if weight tramping is stop for 4-12 weeks. If weight training is perform once or twice a week, muscular strength gains can be maintained. In other words, if training benefit are also be maintain, one should continue to train vigorously at least 3 times a week.

## 5.0 SUMMARY

Exercise training increases blood volume, which makes the body better equipped to divert blood to muscles and skin to supply nutrients and oxygen, to eliminate waste products and to dissipate heat. As the blood gives up fluid in the skin to produce heat, and to the muscles to make them contract better, it becomes thicker. Similarly, as the trained heart becomes bigger and stronger to pump more blood for every heat, muscles become more capable to extract and use oxygen at a higher rate than in untrained condition. The higher V02 max found in endurance trained individuals is thus due to a greater cardiac output and a greater oxygen extraction capacity of the muscles.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. define Physical Fitness
2. list five (5) importance of physical fitness**.**

## 7.0 REFERENCES/FURTHER READING

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# UNIT 3 WHAT IS PHYSICAL FITNESS

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3.1 What is Physical Fitness
4.0 Conclusion
5.0 Summary
6.0 Tutor – Marked Assignment
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## 1.0 INTRODUCTION

According center for diseases control and prevention, Physical fitness is define as the ability to performed daily activities with vigor and alertness, without undue fatigue and still having energy to enjoy leisure time and attend to emergency situations. By this, it explain any activity an individual engages, from waking on bed down to cycling, swimming, and other exercises.

## 2.0 OBJECTIVES

By the end of the unit, you should be able to:

- define physical fitness
- identify the major components of physical fitness
- mention the components from each class

## 3.0 MAIN CONTENT

### 3.1 What is Physical Fitness

Sometimes the terms exercise and physical activity are being confused to be the same; however, the two are independent but interrelated fitness. These terms, in reality, are defined differently. Physical activity refers to badly movements initiated by skeletal muscles that cause expenditure or utilisation of energy. Similarly, it can also be participation in any sporting activities. On the other, hand an exercise is considered to be a subunit of physical activity that entails deliberate, organised, and consistent movements with a predefined objective or purpose. Conversely, the ability of one cardio respiratory indices to supply blood and oxygen to the working muscles during exercise for an extended period of time involving large muscle group is known as physical fitness. It’s also defined as 'the ability to carry out daily tasks

with vigor and alertness, without undue fatigue, and with ample energy to enjoy leisure-time and respond to emergencies.' Based on this definition, fitness involves everything from getting out of bed to hiking to performing CPR. The fitness aspects of an individual are often skill-related and health-related. On the skill related component, there are Speed, Balance, Agility, and Reaction time. While the health related component consisted of Cardio respiratory fitness, Muscular Strength, Muscular Endurance, Body Composition and Flexibility.

Speed: Is typically measured by how quickly an individual can move from one point to another. The 40-yard dash is often used to assess speed. Balance: Typically measured by how long a particular position can be held with or without some type of activity being performed. Simple tests such as standing on one leg can be used to assess balance. More advanced tests may involve standing on an unsteady object while trying to catch a ball. Agility: It is the range of motion at a joint. Cardio -respiratory endurance, basically, measures how long or fast a person can perform an activity and how this impacts the measurements of heart rate and oxygen consumption. Muscular Strength Typically measured by how much weight can be moved in relation to repetitions. Exercises involving multiple joints and muscle groups such as squats or bench press are often used to test muscular strength, Muscular endurance, it measures how many repetition of an exercise a person can perform. Common exercises used to test it are sit – ups and pushups, Flexibility - typically measured by how far a muscle group can be stretched or joint can be moved. The most common tests involve the hamstrings and shoulders, and Body composition - This is the amount of fat on the body versus other tissues such as muscle, bones and skin. It is measured using a variety of tests and devices. Simple tests using mathematical equations or calipers are common and inexpensive. More advanced tests such as underwater weighing are far less common and much more expensive.

## 4.0 CONCLUSION

Participation in regular physical activities leads to healthy aging. Although older people have better gained than other age groups through training, only very few old people exercise regularly compared to other age groups. It should also be note that the aging process is real and the ability to train vigorously decreases with age. It appears that this age related decrease cannot prevent through training. A lower ability to utilise oxygen and a lower heart rate and stroke volume with age seem to be responsible for this age related decrease in aerobic fitness. Similarly, muscular strength decline by 5-10 per cent per decade after 45 years of age. An average individual loses about 30 per cent of muscular strength and about 40 per cent of muscular size between 20 and 70 years of age. This process is known as sarcopenia which is a major reason for

decrease in strength among older people. This decrease in muscular strength and size with increase in age can b adequate resistance training.

## 5.0 SUMMARY

It appears that much of the decrease in cardio respiratory fitness attribute to aging is due to fact people exercise less as the age. Normally, Vo2 max decree by 8-10 per cent per decade after 25 years of age. Much of this loss can be regained if older people follow regular exercise program. Irrespective of age, every individual becomes fitter through regular exercise training than an untrained person. However, older people gain less fitness than younger people when both them train due to the process of aging. As with Vo2 max, muscular strength decree by 5-10 per cent per decade after about 45 years of age. Much of this loss can be regained if weight training program is followed by older people.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Define Physical Fitness
2. List the components of health related
3. Mention exercise to build skills related components

## 7.0 REFERENCES/FURTHER READING

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# UNIT 4 BASIC PRINCIPLES OF FITNESS PROGRAMME

**CONTENTS**

1.0 Introduction
2.0 Objectives
3.0 Main Content
    3.1 Basic Principles of Fitness Programme
    3.2 Effects of Physical Fitness
4.0 Conclusion
5.0 Summary
6.0 Tutor–Marked Assignment
7.0 References for Further Reading

## 1.0 INTRODUCTION

## 2.0 OBJECTIVES

By the end of this unit, you should be able to:

- define principles of fitness
- identify physical programme

## 3.0 MAIN CONTENT

### 3.1 Basic Principles of Fitness Programme

Whether one is an Olympic athlete or a "weekend warrior", there are basic principles of exercise that apply to everyone at all levels of physical training. Adherence to these principles is important for developing an effective fitness program:

1. **Regularity** – To achieve good results from your training, the athlete must exercise often. He should exercise each of the first four components of fitness at least three times a week. Infrequent exercise can do more harm than good. Regularity is also important in resting, sleeping, and following a sensible diet.

2. **Progression** – The intensity and duration of exercise must gradually increase to improve the level of fitness. It is usually recommended that any client must to increase repetitions or duration of their exercises before they increase the intensity in order to prevent injury.

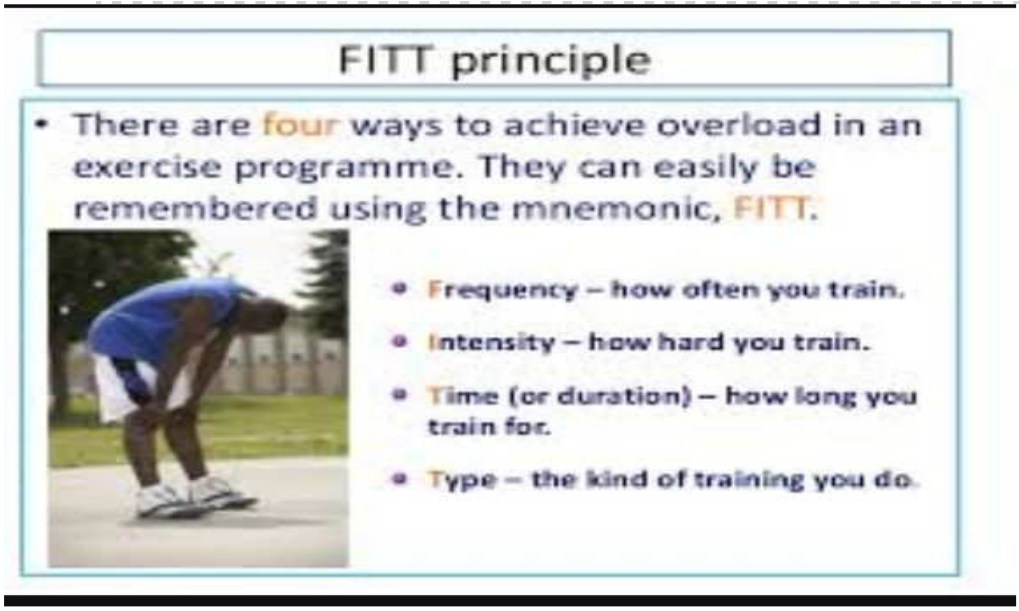
3. **Balance** – To be effective, a fitness program should include activities that address all the components of fitness. Overemphasising one of the components over the others will eventually hurt the other components.

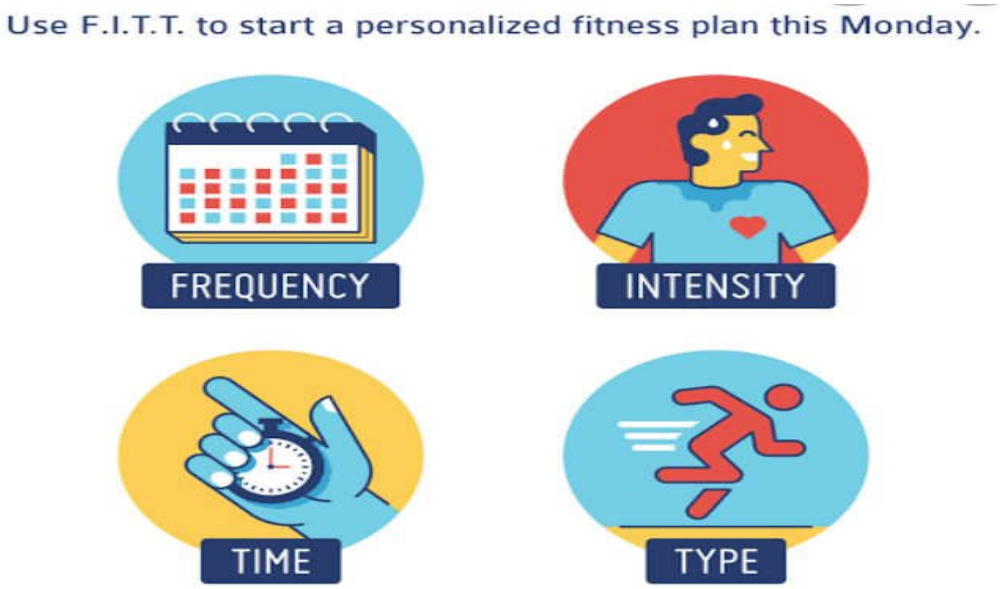
4. **Variety** – Providing a variety of activities reduces boredom and increases motivation and progress.

5. **Specificity** – Training must be geared toward specific goals. For example, people become better basketball players if their training emphasises playing basketball. Although swimming is great exercise, it doesn't improve the free-throw as much as practicing basketball does.

6. **Recovery** – A hard day of training for a given component of fitness should be followed by an easier training day or rest day for that component and/or muscle group to help permit recovery. Another way to allow recovery is to alternate the muscle groups exercised every other day, especially when training for strength and muscle endurance.

7. **Overload** – The work load of each exercise session must exceed the normal demands placed on the body in order to bring about training. The four ways to achieve overload are represented below.






8. **Warm up**- This involves these exercise which primarily increase muscle temperature in preparation for the chosen physical activity, coming up next. It may involve practicing motor skills related to the chosen physical activity. The exercise should be of low workload, not exhaustive. It usually takes about ten (10) minutes involving calisthenics exercises.

9. **Duration-** If the exercise prescribed are to be effective to cause any physiological adaptation the individual should spent at least 20 – 60 minutes engaging large muscle groups of the body in exercising continuously. The duration of exercise however, depends on the purpose of participation and intensity of the workload. The method is commonly used when the intensity of workload is low and the exercise duration is made long especially if the aim of the participation is to expand more calories. Same maybe the same with one who want to lose body fat. But when the intensity of workload is high the time spent should be short.

## 3.2 Effects of Physical Fitness

**i. Controlling blood pressure**.

Physical fitness has proven to support the body's blood pressure. Staying active and exercising regularly builds a stronger heart. The heart is the main organ in charge of systolic blood pressure and diastolic blood pressure. Engaging in a physical activity raises blood pressure. Once the subject stops the activity, the blood pressure returns to normal. The more physical activity, the easier this process becomes, resulting in a more 'fit' individual. Through regular physical fitness, it becomes easier to create a rise in blood pressure. This lowers the force on the arteries, and lowers the overall blood pressure.

**ii. Cancer prevention**.

Centers for disease control and prevention provide lifestyle guidelines for maintaining a balanced diet and engaging in physical activity to reduce the risk of disease. The WCRF/ American Institute for Cancer Research (AICR) published a list of recommendations that reflect the evidence they have found through consistency in fitness and dietary factors that directly relate to cancer prevention.

The WCRF/AICR recommendations include the following:

- Be as lean as possible without becoming underweight.
- Each week, adults should engage in at least 150 minutes of moderate-intensity physical activity or 75 minutes of vigorous-intensity physical activity.
- Children should engage in at least one hour of moderate or vigorous physical activity each week.
- Be physically active for at least thirty minutes every day.
- Avoid sugar, and limit the consumption of energy-packed foods.
- Balance one's diet with a variety of vegetables, grains, fruits, legumes, etc.
- Limit sodium intake, the consumption of red meats, and the consumption of processed meats.
- Limit alcoholic drinks to two for men and one for women a day these recommendations are also widely supported by the American Cancer Society. The guidelines have been evaluated and individuals that have higher guideline adherence scores substantially reduce cancer risk as well as help control a multitude of chronic health problems. Regular physical activity is a factor that helps reduce an individual's blood pressure and improves cholesterol levels, two key components that correlate with heart disease and Type 2 Diabetes. The American Cancer

Society encourages the public to "adopt a physically active lifestyle" by meeting the criteria in a variety of physical activities such as hiking, swimming, circuit training, resistance training, lifting, etc. It is understood that cancer is not a disease that can be cured by physical fitness alone, however, because it is a multifactorial disease, physical fitness is a controllable prevention. The large associations tied with being physically fit and reduced cancer risk are enough to provide a strategy to reduce cancer risk The American Cancer Society asserts different levels of activity ranging from moderate to vigorous to clarify the recommended time spent on a physical activity. These classifications of physical activity consider intentional exercise and basic activities performed on a daily basis and give the public a greater understanding of what fitness levels suffice as future disease prevention

**iii. Inflammation**

Studies have shown an association between increased physical activity and reduced inflammation. It produces both a short-term inflammatory response and a long-term anti-inflammatory effect. Physical activity reduces inflammation in conjunction with or independent of changes in body weight However, the mechanisms linking physical activity to inflammation are unknown.

**iv. Immune system**

Physical activity boosts the immune system. This is dependent on the concentration of endogenous factors (such as sex hormones, metabolic hormones and growth hormones), body temperature, blood flow, hydration status and body position Physical activity has shown to increase the levels of natural killer (NK) cells, NK T cells, macrophages, neutrophils and eosinophils, complements, cytokines, antibodies and T cytotoxic cells. However, the mechanism linking physical activity to immune system is not fully understood.

**v. Weight control**

Achieving resilience through physical fitness promotes a vast and complex range of health-related benefits. Individuals who keep up physical fitness levels generally regulate their distribution of body fat and prevent obesity. Abdominal fat, specifically visceral fat, is most directly affected by engaging in aerobic exercise. Strength training has been known to increase the amount of muscle in the body, however, it can also reduce body fat.[41] Sex steroid hormones, insulin, and appropriate immune responses are factors that mediate metabolism in relation to abdominal fat.

Therefore, physical fitness provides weight control through regulation of these bodily functions.

**vi. Menopause and physical fitness**

Menopause is often said to have occurred when a woman has had no vaginal bleeding for over a year since her last menstrual cycle. There are a number of symptoms connected to menopause, most of which can affect the quality of life of a woman involved in this stage of her life. One way to reduce the severity of the symptoms is to exercise and keep a healthy level of fitness. Prior to and during menopause, as the female body changes, there can be physical, physiological or internal changes to the body. These changes can be reduced or even prevented with regular exercise. These changes include:

- Preventing weight gain: around menopause women tend to experience a reduction in muscle mass and an increase in fat levels. Increasing the amount of physical exercise undertaken can help to prevent these changes
- Reducing the risk of breast cancer: weight loss from regular exercise may offer protection from breast cancer.
- Strengthening bones: physical activity can slow the bone loss associated with menopause, reducing the chance of bone fractures and osteoporosis.
  Reducing the risk of disease: excess weight can increase the risk of heart disease and type 2 diabetes, and regular physical activity can counter these effects.

The Melbourne Women's Midlife Health Project followed 438 women over an eight-year period providing evidence showing that even though physical activity was not associated with VMS in this cohort at the beginning, Women who reported they were

physically active every day at the beginning were 49 per cent less likely to have reported bothersome hot flushes. This is in contrast to women whose level of activity decreased and were more likely to experience bothersome hot flushes.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**vii. Mental health**

Studies have shown that physical activity can improve mental health and well-being. This improvement is due to an increase in blood flow to the brain allowing for the release of hormones as well as a decrease stress hormones in the body like cortisol and adrenaline while also stimulating the human body's mood boosters and natural painkillers. Mental health Physical activity, not only does exercise release these feel-good hormones, but exercise can help take your worries off of whatever that is troubling and it can help build confidence. As physical activity is performed on a consistent basis these trends improve and thus exercise is effective in relieving symptoms of depression and anxiety, positively impacting mental health and bringing about several other benefits, such as the following.

- Physical activity has been linked to the alleviation of depression and anxiety symptoms
- In patients suffering from schizophrenia, physical fitness has been shown to improve their quality of life and decrease the effects of schizophrenia
- Being fit can improve one's self-esteem.
- Working out can improve one's mental alertness and it can reduce fatigue.
- Studies have shown a reduction in stress levels.
- Increased opportunity for social interaction, allowing for improved social skills

- To achieve some of these benefits, the Centers for Disease Control and Prevention suggests at least 30–60 minutes of exercise three to five times a week.

## 4.0 CONCLUSION

So much has been written in many research articles and scholarly journals on physical fitness. However, such literatures hardly reach the general public, most especially those outside the profession. As a result, therefore, the scientific information needed on benefits of regular exercise programme hardly reaches people. The situation has been worsening by the tremendous support that is usually accorded to spectatorship in popular sports such as football. It is disheartening to note that a good number of people spent huge amount of money on transportation, accommodation and feeding to spectators for national and international matches or other events but have not taken time to care to be personally involved in the regular exercise programme for its benefits.

## 5.0 SUMMARY

i. Man's survival and fitness dated back to the period of history when man participated in hunting and other Agricultural activities which contributed greatly in the development and promotion of his physical fitness.

ii. Physical fitness entails the ability of the human body to effectively and efficiently perform daily activities with enough energy and even have reserved energy for unforeseen activities.

iii. Regardless of the status of the individual, he/she requires certain principles to develop and maintain his/her physical fitness. These principles are regularity, progression, balance, variety, specificity, recovery and overload.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Briefly state the History and Development of Physical Fitness.
2. Discuss the Concept of Physical Fitness Programme.
3. Define Physical Fitness Profile.
4. List the Principles of Fitness Programme Development

## 7.0 REFERENCES/FURTHER READING

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## MODULE 2

Unit 1 Components of Physical Fitness
Unit 2 Cardio Respiratory Fitness
Unit 3 Muscular Strength and Endurance
Unit 4 Develop of Physical Fitness Component

## UNIT 1 COMPONENTS OF PHYSICAL FITNESS

### CONTENTS

1.0 Introduction
2.0 Objectives
3.0 Main Content
    3.1 Meaning of Aerobic Fitness
    3.2 Classifications of Physical Fitness Components
4.0 Conclusion
5.0 Summary
6.0 Tutor-Marked Assignment
7.0 Reference/Further Reading

## 1.0 INTRODUCTION

In this unit you will be learning the two kinds of physical fitness, which are health-related fitness and skill-related fitness.

## 2.0 OBJECTIVES

By the end of this unit, you should be able to:

- define the component of physical fitness
- identify the classifications of physical fitness components
- discuss the health related components of physical fitness
- discuss the performance component of physical fitness.

## 3.0 MAIN CONTENT

### 3.1 Meaning of Aerobic Fitness

The aerobic fitness definition is a measure of your body's ability to take oxygen from the atmosphere and use it to produce energy for your muscle cells. Many factors influence aerobic fitness, including your lung efficiency, cardiac function, gender, age and genetic makeup.

Aerobic fitness is your body's ability to transport and utilise oxygen according to ACE Fitness. It's measured by VO2 max, the maximal amount of oxygen you can use during intense exercise. VO2 max is influenced by primary and secondary components. The central component involves the ability of your lungs, heart and vascular system to deliver oxygen to your muscles via your blood stream. The secondary component involves the ability of your muscle cells to extract oxygen from your blood and use it to make adenosine triphosphate, or ATP, the fundamental carrier of energy in cells. extract oxygen from your blood and use it to make adenosine triphosphate, or ATP, the fundamental carrier of energy in cells.

Regardless of how efficiently your heart pumps blood, aerobic fitness is also dependent on the ability of your muscle cells to extract oxygen from your blood and use it to make energy. Aerobic energy is produced in the mitochondria of your muscle cells, using carbohydrates and fats for fuel. Mitochondria are microscopic organelles that function as energy factories for aerobic metabolism.

In response to repeated bouts of aerobic exercise, the density and number of mitochondria increase. High-intensity exercise that challenges your aerobic limit has a more profound effect on mitochondria adaptations and oxygen extraction than low- to moderate-intensity activity.

During high-intensity exercise, you exceed your body's ability to produce aerobic energy, forcing it to tap into anaerobic pathways.

However, the anaerobic fitness definition is that energy can only be sustained for a very limited time, usually less than two minutes. Perpetually exceeding your anaerobic threshold causes your muscles to adapt to perform aerobically at higher intensities.

## 3.2 Classifications of Physical Fitness Components

In the most general terms, a fit person is able to perform tasks with more sustainable energy and for longer periods than an unfit person. But fitness is more than just the ability to work longer; in fact, it includes a number of components. These components are divided into classes:

1. The Health related Components: The related component of the physical fitness include the Cardio respiratory fitness, Muscular Strength and Endurance, strength fitness, flexibility and body composition fitness. They generally have direct relationship to good health and reduce the risk of hydrokinetic diseases.

2. The Performance or Skill related Components: they are also called motor fitness or sport fitness because they are used directly in specific sport or exercise. These include, power, speed, agility, coordination, balance and reaction time.

## 4.0 CONCLUSION

A balanced plan of physical activity and exercise should be followed to promote healthy lifestyle and to improve physical fitness. In this plan, one should engage in physical activities around workplace or home regularly to lay a strong foundation. These activities should be such that they develop aerobic capacity and flexibility. They should be performed at least three to five days a week. Weight resistance exercises and recreational sports should be practiced two to three days a week. High intensity training and competitive sports are recommended only after laying a solid foundation of fitness to prevent injuries. They should be practiced very sparingly as the risk of injuries at this level of training is very high.

## 5.0 SUMMARY

There are two kinds of physical fitness, one is health-related fitness and the other one is skill-related fitness. Health-related fitness is characterised by the ability to perform daily activities with vigor and is associated with a low risk of chronic disease. Health-related fitness has three main components, which include cardio respiratory endurance, musculoskeletal, fitness and optimal body composition. Musculoskeletal fitness includes muscular strength and endurance, and flexibility. Skill-

related fitness includes agility, coordination, balance, reaction time, speed and power. It is more related to sports skills and has nothing to do with health and disease prevention. It is essential for success in sports like soccer, basketball, tennis and volleyball.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Define physical fitness.
2. Identify the components of health related
3. Mention four (4) components of skills related

## 7.0 REFERENCES/FURTHER READING

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# UNIT 2 CARDIO RESPIRATORY FITNESS

## CONTENTS

1.0 Introduction
2.0 Objectives
3.0 Main Content
    3.1 Cardio Respiratory Endurance
4.0 Conclusion
5.0 Summary
6.0 Tutor-Marked Assignment
7.0 Reference/Further Reading

## 1.0 INTRODUCTION

Recent technological developments have reduced the physical demands of day-to-day activities, like washing, cleaning and going to work place. Automobiles has made more time available for leisure pursuits. Unfortunately, most of the newfound leisure time is used for sedentary pursuits, whereas human body is designed for strenuous physical activity. This has resulted in the decline of functional ability of the human body. Exercise scientists and health professionals strongly believe that this increased physical inactivity has led to a rise in the incidence of several degenerative disorders, like coronary heart disease, diabetes, hypertension, obesity and overweight, osteoporosis, osteoarthritis, and some forms of cancer, like breast cancer and colon cancer. This trend in the deterioration of health and increase in the prevalence of these diseases can be arrested or at least minimized if people invest at least 30 minutes, three times a week, in moderate-to-vigorous physical activity. Modest health benefits can be gained by this investment, which costs 150 kilocalories (KCL) a day or 1000kcl a week. Such an investment will reduce the risk of coronary heart disease by 50 percent and the risk of high blood pressure, diabetes and some forms of cancer by 30 percent. To gain these health benefits, every adult should spend 30 minutes or more in moderate-to-vigorous physical activity on most, if possible, all days of the week.

## 2.0 OBJECTIVES

By the end of this unit, you should be able to:

- define Cardio respiratory Fitness
- identify exercise to test or measure Cardio respiratory
- mention three (3) benefits of Cardio respiratory Fitness.

## 3.0 MAIN CONTENT

Cardio respiratory endurance: This is a measure of the circulatory and respiratory systems' ability to deliver oxygen and nutrients to and eliminate waste products from cells. The cells need oxygen and nutrients in order to fuel the muscles during periods of physical activity. When the cells work they produce wastes that need to be transported away. How efficiently the body does these tasks is a measure of your cardio respiratory endurance. An individual can build his cardio respiratory endurance through **aerobic exercise**, which is a type of exercise that uses oxygen to meet energy demands. The word aerobic means using oxygen, so aerobic exercise is literally exercises that use oxygen. This is the type of exercise that is which is performed over time at low to moderate intensity, such as taking a comfortable jog around the neighborhood, riding the bicycle or rowing a boat. Aerobic exercise is important because it strengthens the heart and lungs by making them work harder. Research findings have shown that fit athletes have very low resting heart rates; that's because a high level of fitness leads to a strong heart, which is able to pump a lot of blood with fewer heartbeats. Below is an illustration showing the Cardio respiratory fitness exercise.

## 4.0 CONCLUSION

Health and fitness represent a positive quality that is closely associated with the prevention of many diseases, physical fitness emphasizes the promotion of vigour, vitality and energy for participation in physical work rind exercise. Subjective estimation of physical fitness is possible by determining how much energy one has to spend to perform enjoyable tasks, like walking, cycling and gardening. However, vigour, vitality and

energy cannot be measured easily. Expert." In the field of fitness strongly believe that when people exercise adequately to keep their heart, lungs and muscles in shape, they are considered to be in fit condition.

## 5.0 SUMMARY

Regular participation in physical activities to develop cardio -respiratory endurance, musculoskeletal fitness and optimum body composition promotes the basic energy levels of the participants and helps them to be at lower risk for chronic diseases, like cancer, osteoporosis, heart diseases and diabetes. It is with this view that the American College of Sports Medicine has defined health related fitness ors "a state characterised by an ability to perform daily activities with vigour and a demonstration of traits and capacity that are associated with low risk of premature development of the hypokinetic diseases.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Define Cardio respiratory Fitness.
2. Mention four (4) Physical activity to measure CRF.

## 7.0 REFERENCE/FURTHER READING

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# UNIT 3 MUSCULAR STRENGTH AND ENDURANCE

## CONTENTS

1.0 Introduction
2.0 Objectives
3.0 Main Content
    3.1 Muscular Strength
        3.1.1 Flexibility
        3.1.2 Body composition.
        3.1.3 Power
        3.1.4 Speed
        3.1.5 Agility
        3.1.6 Coordination
        3.1.7 Balance
        3.1.8 Reaction Time
4.0 Conclusion
5.0 Summary
6.0 Tutor-Marked Assignment
7.0 Reference/Further Reading

## 1.0 INTRODUCTION

It is the ability of the skeletal and muscular systems to perform work, which involves muscular strength, muscular endurance, bone strength and flexibility. Muscular strength is the maximal force that can be exerted against resistance. Muscular endurance is the ability of the muscles to produce sub-maximal force repeatedly over a prolonged period of time. Bone strength reflects the risk of bone fracture. It is a function of the mineral content and bone density

## 2.0 OBJECTIVES

By the end of this unit, you should be able to:

- define muscular endurance and strength
- list four (4) physical activity to measure muscular endurance or strength

## 3.0 MAIN CONTENT

## 3.1 Muscular strength

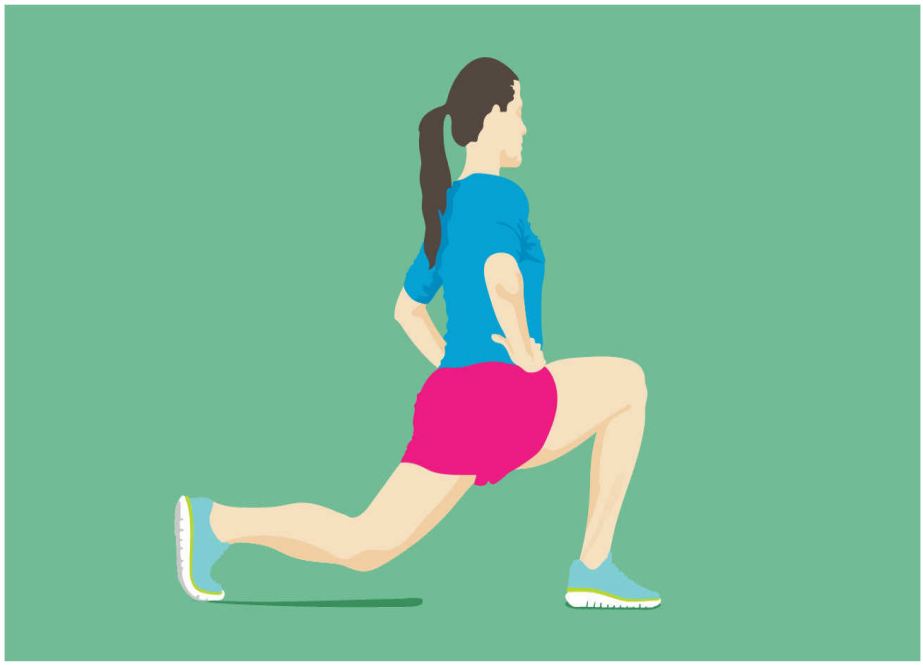
This is the “power” that helps the athlete to lift and carry heavy objects. Without muscular strength, the body would be weak and unable to keep

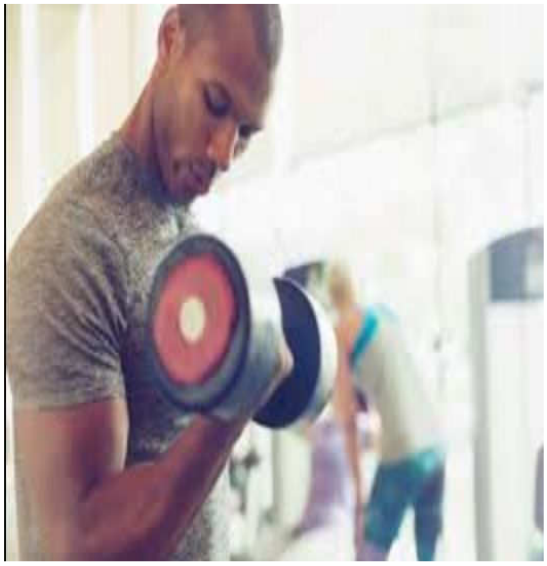
up with the demands placed upon it. The way to increase strength is to train with heavy weights, working in the 4 – 6 or 12 – 15 rep ranges. The heavier the weight, the fewer reps the athlete should perform. Illustrate

- **Muscular endurance:** Endurance is the ability of the muscles to perform contractions for extended periods of time. Rather than just lifting or carrying something for a few seconds, the muscles are used for minutes. The way to increase strength is to train with light weights, working in the 20 – 25 repetition range. Working with lighter weight will train the muscle fibers needed for muscular endurance, and the higher repetition range leads to a longer period of exercise. It is also the ability of muscles to exert sub maximal effort repetitively (contract over and over again or hold a contraction for a long time). Muscular strength and endurance exercise are shown below:

- Strength, power and muscular endurance are fitness components with many things in common. They require the application of muscular force to overcome resistance while in motion; they involve muscular contraction of a specific muscle or muscle group; and they are measurable components of fitness.

- Muscular endurance is the ability of a muscle or muscle group to exert force to overcome a resistance many times. Often the resistance is the body itself. The measurement of muscular endurance is based on the number of repetitions performed. Muscular endurance is specific to the assessment.



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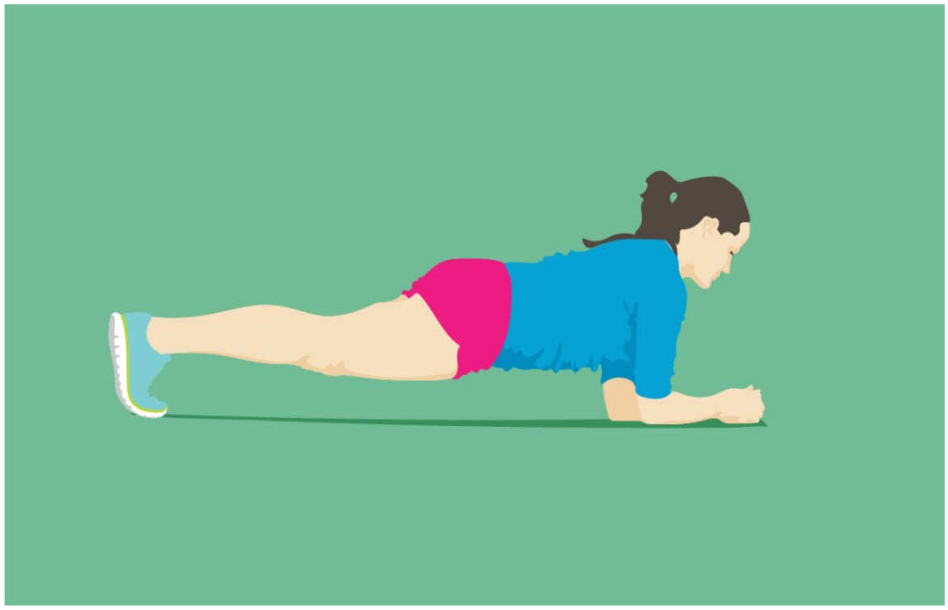
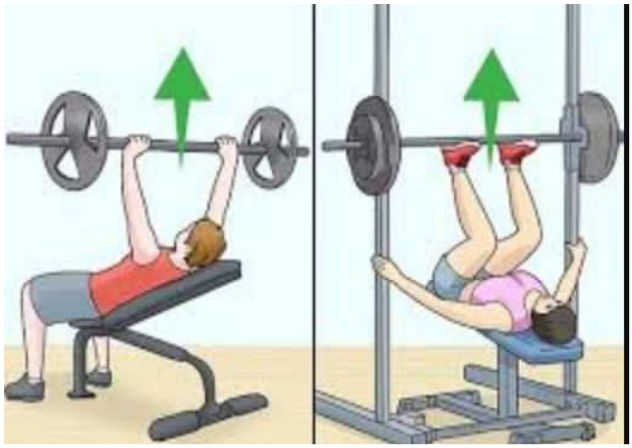




### 3.1.1 Flexibility

Flexibility is the ability of moving a joint through the range of motion. Flexibility is an important part of physical fitness. Some types of physical activity, such as dancing, require more flexibility than others. Stretching exercises are effective in increasing flexibility, and thereby can allow people to more easily do activities that require greater flexibility. For this reason, flexibility activities are an appropriate part of a physical activity programme , even though they have no known health benefits and it is unclear whether they reduce risk of injury. Time spent doing flexibility activities by themselves does not count toward meeting the aerobic or muscle-strengthening Guidelines. Although there are not specific national guidelines for flexibility, adults should do flexibility exercises at least two or three days each week to improve range of motion. This can be done by holding a stretch for 10-30 seconds to the point of tightness or slight discomfort. Repeat each stretch two to four times, accumulating 60 seconds per stretch. Therefore, activities to improve flexibility should be performed daily. Dynamic and static stretches are safe and effective methods to improve flexibility. **Dynamic stretches** involve moving parts of the body continuously while gradually increasing reach, speed of movement or both gently throughout a full range of motion. **Static stretches** involve stretching a muscle to the point of mild discomfort for an extended period of time. These stretches can be performed as part of the warm-up and/or cool down phase of a fitness program or as a separate flexibility programme.

### 3.1.2 Body composition.

This is the combination of fat mass and fat-free mass, including bones, muscles, organs, and water. Healthy levels of fat mass are essential for insulation, the protection of organs, absorption of vitamins, nerve conduction and as an energy source. Having too much or too little fat mass can become a health risk, lower performance and detract from

appearance. Therefore, body composition is usually referred to as a percentage of body fat.

A healthy level of fat mass for men is between 10 per cent and 20 per cent of total body weight and a healthy level of fat mass for women is between 15 per cent and 25 per cent of total body weight. Improving and maintaining body composition at healthy levels will reduce the risk of heart disease, Type 2 diabetes, high blood pressure, strokes, certain types of cancer and obesity

### 3.1.3 Power

Power is the ability to move the body parts swiftly while applying the maximum force of the muscles. Power is a combination of both speed and muscular strength. Fullbacks in football use power to muscle their way through other players to advance the ball. Other activities that require power include shot put, a volleyball serve, and a basketball dunk.

### 3.1.4 Speed

Speed is the ability to move your body or parts of your body swiftly. It is the amount of time it takes the body to perform specific tasks. Many sports rely on speed to gain advantage over your opponents. Sprinters, cyclists, soccer players, and swimmers are among the many athletes that rely on speed.

If you have clients is interested in speed, they're probably runners. Competing in races and going for personal best times are great motivational tools for fitness. The clients with the drive to do what it takes to get faster are fun to work with and make your job a little

easier. There are plenty of exercises to help them improve speed, but don't restrict these workouts to your driven, runner clients.

Those who like to play pick up soccer games in the park; the clients who need more energy to keep up with their kids; and even the senior clients can all benefit from working on speed in all kinds of sports and activities. For your clients, you can dig deep and do some selective workouts and exercises to help them get faster. For other clients, sneak these workouts in to change things up and help them develop the power and strength needed to move faster and more efficiently in everything they do.

**Running Workouts to Build Speed**

To be a faster runner you have to, run more and run faster. By pushing the limits at least once a week, your running clients will build fitness, endurance, and speed over time. There are several different kinds of speed workouts and drills you can do with them:

**Hill Sprints**

Take your workout outdoors and find some hills to charge up for a great speed workout. You can use a treadmill with an adjustable incline, but going outside is much more fun. Uphill sprints at an all-out speed for 10 to 20 seconds should be followed by enough recovery time to bring the heart rate down a little. This can be a really intense workout, so ease your runners into it. You don't need a very steep hill either. Start out small, do just a few reps per workout, and build on that strength with steeper inclines, more reps, and less recovery time.

**Interval Runs**

Intervals runs are like HIIT workouts: you work at high intensity for a short period of time, recover, and do it again. If you have access to a track, use it for your interval speed workouts. You can adjust a basic interval workout for each client and their current fitness level:

- Run hard for 50 meters, walk or jog for another 50
- Run hard for 100 meters, walk or jog for 50 meters
- Run hard for 150 meters, walk or jog for 50 meters
- Run hard for 200 meters, walk or job for 50 meters
- Work back down to 50 meters and repeat once or twice for clients who are up to the challenge

Interval workouts can also include longer distances, but make sure your clients moderate their pace. The 50 to 200 meter hard runs should be at an all-out pace. For 400 meters and more, take the pace down a little.

Learn everything you need to know about high intensity interval training and how to incorporate it into your clients' routines with.

### 3.1.5 Agility

Agility is the ability to rapidly and accurately change the direction of the body. Agility is important in sports such as tennis which requires players to change direction quickly to hit the ball. Agility is the general ability to change direction when moving quickly and efficiently, all while maintaining proper posture and movement mechanics.

Good agility requires the ability to safely decelerate, reorient, and reaccelerate in as little time as possible. In a sporting context, agility typically incorporates this change of direction in response to a stimulus, as an athlete's change in movement and direction during play almost always occurs in response to the movements of opposing players. Therefore, agility training involves a range of exercises designed to improve your ability to change directions during movement.

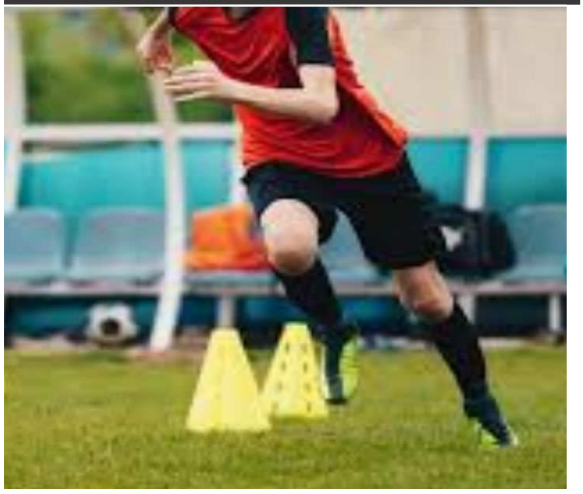
When it comes to measuring improvements in agility, if you can run forward, side shuffle, backpedal, and reaccelerate faster than before, your agility has improved.

**The benefits of agility training**
Agility training brings a host of benefits for individuals of all ages, occupations, and fitness needs.

For general fitness, when compared with inactivity, agility training improves a range of physical performance metrics including:

- lower and upper body strength
- lower body and trunk explosive power
- walking mechanics and endurance
- balance
- mobility

When comparing traditional training programs that don't incorporate agility with agility-based programs, research found that the benefits of agility exercises were slightly greater on the compared parameters. For example, most of the agility programmes studied required less total time to achieve similar results, compared with other fitness training methods. Additional research found that among older adults, agility-based programs were at least as effective as traditional balance and strength training at improving balance and endurance. However, the agility training led to greater improvements in explosive power, particularly in the legs and trunk.



### 3.1.6 Coordination

Coordination is the ability to use the senses together with body parts in order to perform motor tasks smoothly and accurately. Coordination is important in activities such as dribbling a basketball, juggling, and is also vital for sports involving hitting objects. Coordination is one element of movement that is important in sports and in day-to-day living. Coordination generally refers to moving two or more parts of your body at the same time to achieve a specific goal. That could mean turning a doorknob, performing dance steps or hitting a baseball with a bat. Adding certain exercises to your daily routine may improve your coordination overall.

**Circles**
Moving your upper and lower body at the same time in opposite directions is a challenge for many people and, as such, is an effective exercise to improve your overall coordination. Stand comfortably and hold out your arms. Move one arm in forward circles and the other in backward circles. Also, circle one arm and one leg at the same time or do one leg with both arms going in opposite directions.

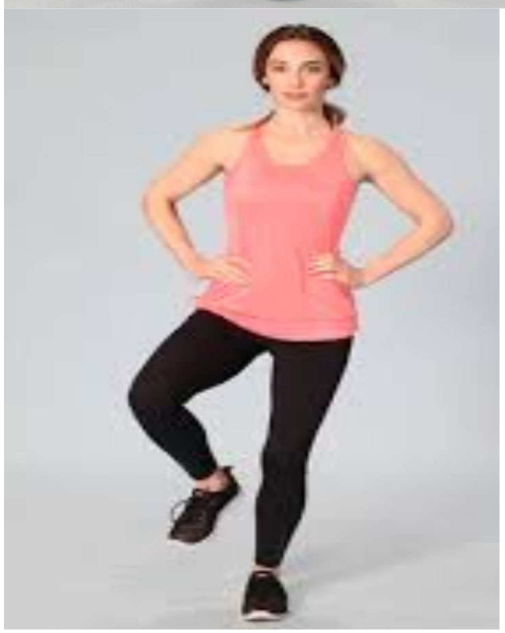
**Jumping Rope**
Jumping rope is a common exercise in boxing and martial arts to improve footwork, balance and coordination. You will get into a rhythm after some practice, so mix up your routine once you're comfortable with the basic motion. Run in place while spinning the rope, hop on one foot, alternate kicking one foot out and cross the rope in front of you. Experiment with different footwork combinations to challenge your coordination.

**Speed Bag**
The speed bag is another boxing staple and effective coordination exercise. Just as with rope jumping, you can create a rhythm with the speed bag, so it is a good idea to change the routine as you go. Hit the bag with different parts of your hand or change the number of times it bounces back and forth before you hit it again. In the beginning, just making contact each time is enough to challenge your reflexes and coordination.

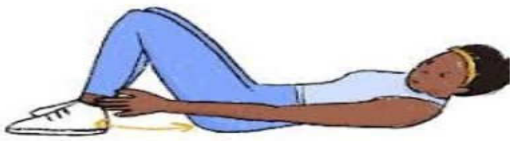
**Racquet Sports**
Sports that are played with a racquet and ball -- such as tennis, squash, racquetball and ping pong -- are effective coordination exercises. If you don't have a partner, hit the ball against a wall or tilt the ping pong table up to hit the ball to yourself. Practice moving from side to side and hitting the ball from different elevations to refine your hand-eye coordination.

### 3.1.7 Balance

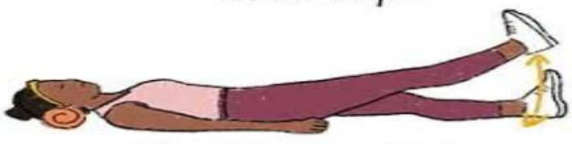
Balance is the ability to control or stabilise the body when a person is standing still or moving. Balance is important in sports such as dance, gymnastics, ice hockey, figure skating, and other sports requiring extreme control.



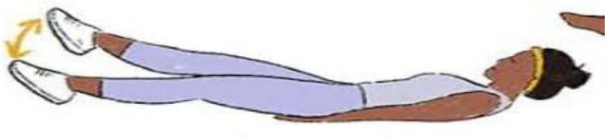
High Knees



Heel Taps



Straight Leg Raises



Scissor Kicks

### 3.1.8 Reaction Time

This is the ability to reach or respond quickly to what you hear, see, or feel. An athlete quickly coming off the blocks early in a swimming or track relay or stealing a base in baseball needs quick reaction time.


## 4.0 CONCLUSION

There are many exercise protocols and sports that develop components of both skill and health-related physical fitness. Sports like soccer, basketball, handball, field hockey and volleyball can fitness activities, like running and cycling, to improve their fitness. One of the most important reasons for his preference is that the competitive and social aspects of sports make them enjoyable, which help in the promotion of long-lasting compliance. However, sports like table tennis, volleyball, softball and bowling contribute little to the development of health related fitness, although they do demand some athletic skills. This is mainly because of the fact that they are inadequate to stimulate cardiovascular, respiratory and muscular systems at a level required to produce positive changes. It is therefore necessary that these sports should be supplemented with fitness activities, like running, brisk walking and cycling J to promote long-term health.

## 5.0 SUMMARY

The condition in which regular exercise training is stop is called detraining. It cause sudden and significant changes in cardio respiratory fitness and some extend in muscular strength and size. In few weeks of detraining, stroke volume and blood volume decrease, causing a significant decline in cardio respiratory fitness. This situation can be avoided by exercising at an intensity of 70 per cent of Vo2 max. Similarly gain return to pre-training levels if weight tramping is stop for 4-12 weeks. If weight training is performing once or twice a week, muscular strength gains can be maintained. In other words, if training benefit are also be maintain, one should continue to train vigorously at least three times a week.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Define Agility, Speed, Balance and Power.
2. Mention two (2) exercises on each to test it significant effects.

## 7.0 REFERENCE/FURTHER READING

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# UNIT 4 DEVELOP OF PHYSICAL FITNESS COMPONENT

## CONTENTS

1.0 Introduction
2.0 Objectives
3.0 Main Content
    3.1 Develop of Physical Fitness Component
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7.0 References/Further Reading

## 1.0 INTRODUCTION

The human body is designed for work. The arrangement of muscle groups, tendons and ligaments allows the arms and legs to move in a wide variety of activities. The brain controls and regulates the distribution of blood, oxygen, and nutrients from the hearth and lungs. The different system of the body are in communication with each other through hormonal and nervous pathways to achieve coordination in the performance of an activity. The more these systems are involved the more enjoyable and efficient exercise becomes. Contrary to this, inactivity leads to poor health. An attempt is therefore made in this chapter to discuss the major benefit of exercise training to the human body and also the influence of genetics, gender and age.

## 2.0 OBJECTIVES

By the end of this unit, you should be able:

- define physical fitness
- differentiate health and skills or performance related components
- list three (3) examples from each component

# 3.0 MAIN CONTENT

## 3.1 Develop of Physical Fitness Component

This kind of activities, which includes **resistance training** and lifting weights, causes the body's muscles to work or hold against an applied force or weight. These activities often involve relatively heavy objects, such as weights, which are lifted multiple times to train various muscle groups. Muscle-strengthening activity can also be done by using elastic bands or body weight for resistance (climbing a tree or doing push-ups, for example). Activities for Muscular Strength and Endurance also have three components:

- **Intensity,** or how much weight or force is used relative to how much a person is able to lift;

- **Frequency**, or how often a person does muscle strengthening activity; and

- **Repetitions** or how many times a person lifts a weight (analogous to duration for aerobic activity). Repetitions play a key role in determining if an activity is improving muscular strength or endurance. Low repetitions with more weight will focus more on muscular strength, while high repetitions with less weight will focus more on muscular endurance. The effects of muscle-strengthening activity are limited to the muscles doing the work. It's important to work all the major muscle groups of the body: the legs, hips, back, abdomen, chest, shoulders, and arms. It is important to note that Weight lifting isn’t just about bulking up and building muscle mass, the experts say. Its benefits include improved posture, better sleep, gaining bone density, maintaining weight loss, boosting metabolism, lowering inflammation and staving off chronic disease, among a laundry list of positives. Also, weight lifting for beginners involves major steps. Some of which include:

- 

1. Starting with individual bodyweight that involves using resistance to create work for your muscles.

2. Nail down your form.
With many gyms still closed—and even if ones in your area are open, you may not feel comfortable going to them right now—it's not as easy as it once one to get some real-time feedback on your form. But even though most personal trainers aren't operating in person currently, you can still benefit from their

professional expertise virtually (if you have room in your budget for it).

A personal trainer can help you master those basic movement patterns, which set the stage for many of the exercises you'll be doing,

If you don't have room in your budget for a personal trainer, online tutorials can help you learn what a proper move should look like, and working out in front of a mirror (or videoing it on your phone).

3. Invest in some equipment.
While starting with bodyweight moves is an important key, you probably will want to eventually add weights to your weight training plan. Weights, like most other kinds of at-home fitness equipment, have been pretty difficult to find online during the corona virus pandemic, but they have slowly been coming back into stock at some retailers.

If you can find them, dumbbells are probably the most user-friendly weight option for beginners—more so than kettle bells or barbells, which have more of a learning curve to use properly and safely, says Fagan. Ideally, you'll have three sets: a light, moderate, and a heavy (5 pounds, 12 pounds, and 20 pounds are good examples, she says).

4. Prep your muscles before you start.
A proper warm-up is an important part of an effective strength workout. Start by waking up your muscles with a foam roller. Foam rolling loosens up tight muscles so that they work the way they're designed to.

5. Schedule regular workouts—but don't go overboard.

6. Lift the right amount of weight.
When you first start, you should stick to about 12-15 reps per set. Different exercises will require different weights, but there are some markers that can help guide you toward the right resistance, whether you're using dumbbells, kettle bells, or a barbell. Go for a weight that feels heavy enough to challenge you, but not so heavy that you sacrifice your form.

7. Continue with the same moves each day when you're starting out.

8. Fit in a post-workout stretch if you can.

Now that you've got the training part down, it's time to stretch it out. Stretching while your muscles are warm can help improve your flexibility.

9. Take rest days when your body tells you to
This is because if you constantly break down muscle without a recovery period, you won't give the muscle fibers a chance to repair and build back stronger

Illustrations showing individual lifting weight to exercise their muscles are given below:

Also, muscle-strengthening activities provide additional benefits not found with aerobic activity. The benefits of muscle-strengthening activity include increased bone strength and muscular fitness. Muscle-strengthening activities can also help maintain muscle mass during a programme of weight loss. Muscle-strengthening activities make muscles do more work than they are accustomed to doing. Other examples include working with resistance bands, doing calisthenics that use body weight for resistance (such as push-ups, pull-ups, and sit-ups), carrying heavy loads, and heavy gardening (such as digging or hoeing).

Muscle-strengthening activities count if they involve a moderate to high level of intensity or effort and work the major muscle groups of the body: the legs, hips, back, chest, abdomen, shoulders, and arms. Muscle strengthening activities for all the major muscle groups should be done at least two days a week.

No specific amount of time is recommended for muscle strengthening, but muscle strengthening exercises should be performed to the point at which it would be difficult to do another repetition without help. When resistance training is used to enhance muscle strength, one set of 8 to 12 repetitions of each exercise is effective, although two or three sets may be more effective. Development of muscle strength and endurance is progressive over time. Increases in the amount of weight or the days a week of exercising will result in stronger muscles.

It is important to note that the use of weight is demonstrated by its do’s and don’ts as itemised below:

Weight training do's

Lift an appropriate amount of weight: Start with a weight you can lift comfortably 12 to 15 times.

For most people, a single set of 12 to 15 repetitions with a weight that fatigues the muscles can build strength efficiently and can be as effective as three sets of the same exercise. As you get stronger, gradually increase the amount of weight.

**Use proper form**: Learn to do each exercise correctly. When lifting weights, move through the full range of motion in your joints. The better your form, the better your results, and the less likely you are to hurt yourself. If you're unable to maintain good form, decrease the weight or the number of repetitions. Remember that proper form matters even when you pick up and replace your weights on the weight racks.

If you're not sure whether you're doing a particular exercise correctly, ask a personal trainer or other fitness specialist for help.

**Breathe:** You might be tempted to hold your breath while you're lifting weights. Don't hold your breath. Instead, breathe out as you lift the weight and breathe in as you lower the weight.

**Seek balance:** Work all of your major muscles — including the abdomen, hips, legs, chest, back, shoulders and arms. Strengthen the opposing muscles in a balanced way, such as the fronts and backs of the arms.

Add strength training in your fitness routine. The U.S. Department of Health and Human Services recommends incorporating strength training exercises of all the major muscle groups into a fitness routine at least two times a week.

**Rest:** Avoid exercising the same muscles two days in a row. You might work all of your major muscle groups at a single session two or three times a week, or plan daily sessions for specific muscle groups. For example, work your arms and shoulders on Monday, your legs on Tuesday, and so on.

**Weight training don'ts**
Follow these tips to avoid common mistakes when you're weight training:

**Don't skip the warmup:** Cold muscles are more prone to injury than are warm muscles. Before you lift weights, warm up with five to 10 minutes of brisk walking or other aerobic activity.

**Don't rush:** Move the weight in an unhurried, controlled fashion. Taking it slow helps you isolate the muscles you want to work and

keeps you from relying on momentum to lift the weight. Make sure you rest for about one minute between each exercise.

**Don't overdo:** For most people, completing one set of exercises to the point of fatigue is usually enough. Additional sets may take up extra time and contribute to overload injury. However, the number of sets that you perform may differ depending on your fitness goals.

**Don't ignore pain:** If an exercise causes pain, stop. Try the exercise again in a few days or try it with less weight.

**Don't forget your shoes:** Shoes that protect your feet and provide good traction can keep you from slipping or injuring your feet while you're lifting weights.

Remember, the more you concentrate on proper weight training technique, the more you'll get out of your weight training program.

## 3.2 Other Exercise to Develop and Maintain Health Related Components

Whether an athlete is a novice taking the first steps toward fitness or an exercise fanatic hoping to optimise his/her fitness level results, a well-rounded fitness training programme is essential. These include the five elements that would create a balanced routine.

### 3.2.1 Aerobic fitness

Aerobic activity, also known as cardio or endurance activity is the cornerstone of most fitness training programme Aerobic activity or exercise causes the athlete to breathe faster and more deeply, which maximises the amount of oxygen in the blood. The heart will beat faster, which increases blood flow to your muscles and back to the lungs.

The better the aerobic fitness, the more efficiently the heart, lungs and blood vessels transport oxygen throughout the body and the easier it is to complete routine physical tasks and rise to unexpected challenges, . Aerobic activity includes any physical activity that uses large muscle groups and increases the heart rate. Example walking, jogging,
biking, swimming, dancing, water aerobics.

For most healthy adults, the Department of Health and Human Services recommends that they get at least 150 minutes of moderate aerobic activity or 75 minutes of vigorous aerobic activity a week, or a combination of moderate and vigorous activity. The guidelines suggest that the exerciser should spread out this exercise during the course of a

week. One can even break up activity into shorter periods of exercise and aim to move more during the day. Any amount is better than none at all. The athlete can also try high-intensity interval training, which involves alternating short bursts of intense activity (around 30 seconds) with subsequent recovery periods (around three to four minutes) of lighter activity. For example, the exerciser could alternate periods of brisk walking with periods of leisurely walking, or include bursts of jogging in his/her brisk walks.

### 3.2.2 Strength training

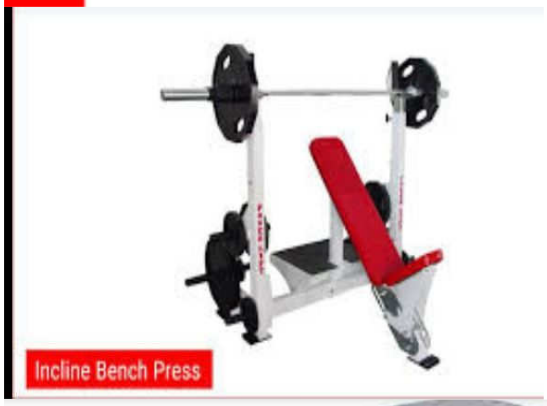
Muscular fitness is another key component of a fitness training program. Strength training can help one to increase bone strength and muscular fitness, and it can help him manage or lose weight. It can also improve the ability to do everyday activities. Aim to include strength training of all the major muscle groups into the fitness routine at least twice a week.

Most fitness centers offer various resistance machines, free weights and other tools for strength training as shown below. However, one doesn't need to invest in a gym membership or expensive equipment to reap the benefits of strength training. Hand-held weights or homemade weights — such as plastic soft drink bottles filled with water or sand — may work just as well. Resistance bands are another inexpensive option. One's body weight counts, too. Try pushups, pull-ups, abdominal crunches and leg squats.


Lat Pulldown Machine


Abdominal Bench


Barbells


Incline Bench Press

### 3.2.3 Core exercises

The muscles of the abdomen, lower back and pelvis — known as the core muscles — help protect the back and connect upper and lower body movements. Core strength is a key element of a well-rounded fitness training programme. Core exercises help train the muscles to brace the spine and enable you to use the upper and lower body muscles more effectively. So what counts as a core exercise? A core exercise is any exercise that uses the trunk of the body without support, such as bridges, planks, sit-ups and fitness ball exercises.

### 3.2.4 Flexibility and Stretching

Flexibility is an important aspect of physical fitness, and it's a good idea to include stretching and flexibility activities in a fitness programme. Stretching exercises can help increase flexibility, which can make it easier for you to do many everyday activities that require flexibility.

Stretching can also improve the range of motion of the joints and may promote better posture. Regular stretching can even help relieve stress and tension.

Consider stretching after the exercise when the muscles are warm and receptive to stretching. But when the athlete wants to stretch before a workout, warm up first by walking or exercising for five to 10 minutes before stretching. Ideally, the athlete stretches whenever he/she exercise. If the athlete don't exercise regularly, he/she might want to stretch at least two to three times a week after warming up to maintain flexibility. Activities such as yoga as well as others shown below promote flexibility too.


## IMPORTANCE OF AEROBIC EXERCISE

i. **Keep excess pounds at bay:** Combined with a healthy diet, aerobic exercise helps you lose weight and keep it off.

ii. **Increase your stamina, fitness and strength:** You may feel tired when you first start regular aerobic exercise. But over the long term, you'll enjoy increased stamina and reduced fatigue. You can also gain increased heart and lung fitness and bone and muscle strength over time.

iii. **Ward off viral illnesses:** Aerobic exercise activates your immune system in a good way. This may leave you less susceptible to minor viral illnesses, such as colds and flu.

iv. **Reduce your health risks:** Aerobic exercise reduces the risk of many conditions, including obesity, heart disease, high blood pressure, type 2 diabetes, metabolic syndrome, stroke and certain types of cancer. Weight-bearing aerobic exercises, such as walking, help decrease the risk of osteoporosis.

v. **Manage chronic conditions:** Aerobic exercise may help lower blood pressure and control blood sugar. It can reduce pain and improve function in people with arthritis. It can also improve the quality of life and fitness in people who've had cancer. If you

have coronary artery disease, aerobic exercise may help you manage your condition.

vi. **Strengthen your heart:** A stronger heart doesn't need to beat as fast. A stronger heart also pumps blood more efficiently, which improves blood flow to all parts of your body.

vii. **Keep your arteries clear:** Aerobic exercise boosts your high-density lipoprotein (HDL), the "good," cholesterol, and lowers your low-density lipoprotein (LDL), the "bad," cholesterol. This may result in less buildup of plaques in your arteries.

viii. **Boost your mood:** Aerobic exercise may ease the gloominess of depression, reduce the tension associated with anxiety and promote relaxation. It can also improve your sleep.

ix. **Stay active and independent as you age:** Aerobic exercise keeps your muscles strong, which can help you maintain mobility as you get older. Exercise can also lower the risk of falls and injuries from falls in older adults. And it can improve your quality of life. Aerobic exercise also keeps your mind sharp. Regular physical activity may help protect memory, reasoning, judgment and thinking skills (cognitive function) in older adults. It may also improve cognitive function in children and young adults. It can even help prevent the onset of dementia and improve cognition in people with dementia.

x. **Live longer**

Studies show that people who participate in regular aerobic exercise live longer than those who don't exercise regularly. They may also have a lower risk of dying of all causes, such as heart disease and certain cancers.

Exercise for Aerobic Fitness

**Running/jogging**

**Equipment:** Running shoes

**How to do it:** If you're new to running, start slow and alternate walking and running for 1 minute at a time — and don't forget to cool down and stretch! Aim for shorter sessions a couple of times a week at first, and then add more as you get stronger. Duration and frequency 20–60 minutes, two or three times per week

**Walking**

**Equipment:** Sneakers with good ankle support

**How to do it:** When you pick up the pace to get your heart, pumping, walking is awesome aerobic exercise because you can do it just about anywhere without looking like you're working out. Squeeze in a few brisk 10-minute walks before and after work and at lunchtime or carve out time for longer walks. Use the step counter on your phone or a fitness tracker to monitor your steps. Set a goal — 10,000 steps per day, 1,000 more per day than you averaged last month, or whatever works for you — and hit the pavement. Work your way toward your goal by adding 500 to 1,000 steps to your daily tally every week until

you hit your desired milestone. Duration and frequency 30–60 minutes, two or three times per week

**Dancing**

**Equipment:** Sneakers (optional) and music

**How to do it:** Dancing is the perfect aerobic exercise for people who hate working out. You get to turn on your favourite music and dance your heart out — in the privacy of your bedroom, if you choose. Don't worry about how you look. Just move before you know it, you'll have been dancing for 30 minutes, an hour, or more — it's the most fun you can have while exercising duration and frequency 20–60 minutes, two or three times per week

### Jump rope

**Equipment:** Sneakers and a jump rope

**How to do it:** If you're new to jumping rope, start with a goal of a set number of minutes or number of reps. go a little longer each time. Beyond the usual cardio benefits, jumping rope can improve your proprioception (aka body awareness), agility, and hand-foot coordination. Use this 15-minute jump rope workout to help you get started. Duration and frequency 10–25 minutes, two or three times per week

### Aerobic strength circuit

**Equipment:** Sneakers and a sturdy chair or couch

**How to do it:** Yes, strength moves can be aerobic exercises! Circuits keep you moving to get your blood pumping, and they build strength in major muscle groups. Use this strength and cardio circuit or build your own with classic moves, performing each for one minute at a time:

- squats
- lunges
- push-ups
- planks
- glute bridges

Walk or jog in place at the end of each circuit for a little active rest, and repeat the circuit two or three times. Feel free to rest for a few minutes (no more than five) between rounds, and don't forget your cool down Duration and frequency15–25 minutes, 3–5 times per week

**Aerobic gym exercises**

**Stair mill/stair stepper**

**Equipment:** Sneakers

**How to do it:** You know how challenging walking up several flights of stairs can be — and a stair mill or stair stepper turns that everyday activity into an aerobic exercise. Make sure you stay upright and don't lean on the handles. Use your legs to step up and down, and keep your eyes forward while engaging your core. Start at a slow pace to warm up, and then add resistance until you feel yourself working at a challenging pace you can maintain for the duration of your workout. Slow it back down to cool down. Start with short bursts — stair stepping is a challenge for new and conditioned exercisers alike. Duration and frequency are 20–60 minutes three times per week.

**Swimming**

**Equipment:** Pool, swimsuit, and (optional) swim cap and goggles

**How to do it:** Swimming is a great workout that's also no-impact, especially if your joints complain when you're walking or running.

Start with laps using one stroke (the freestyle is great for newbie). Add more when you feel up to it, like the breaststroke, the backstroke, or (for more advanced swimmers) the butterfly. Rest between laps as needed, and never swim alone or without a lifeguard present. Duration and frequency are 10–30 minutes, two to five times a week. Try to increase your duration by five minutes each week.

**Stationary bike**

**Equipment:** Stationary bike, padded bike seat or shorts (optional), and sturdy shoes (cycling shoes optional)

How to do it Make sure you adjust the bike to the proper height — at the gym, you can ask your cycling instructor to help. Otherwise, you could end up hurting your knees Warm up by riding at an easy pace for 5–10 minutes, and then increase your pace until it feels challenging. Ride steadily at that pace, coming out of the seat as needed, for 20–30 minutes to start. Ride slowly for five minutes to cool down. Duration and frequency 30–60 minutes, three times per week

**Elliptical**

**Equipment:** Elliptical machine and sneakers

**How to do it:** Make sure you stay upright and don't lean on the handles. Use your legs to pedal, and keep your eyes forward while engaging your core. Start at a slow pace to warm up, and then add resistance until you feel yourself working at a challenging pace you can maintain for the duration of your workout. Slow it back down to cool down. Duration and frequency:20–60 minutes, two or three times per week

## 4.0 CONCLUSION

The component of physical fitness is an aspect of physical fitness. The interactions of the two components make it possible for an individual to achieve and maintain a high standard of physical fitness. Therefore, the roles of health-related component in the promotion of physical fitness status of an individual cannot be overemphasis.

## 5.0 SUMMARY

In this unit we have learnt that:

i. that physical fitness is determined by performance in different components
ii. The components of physical fitness are sub divided into Health Related and Performance or Skill related
iii. The health related components, aims at promoting the well-being of an individual. The components are: Cardio respiratory fitness, Muscular Strength/ Endurance, Flexibility and Body Composition.
iv. The cardio respiratory fitness is the ability of the heart, blood vessels and the lungs to provide adequate oxygen to working muscles to enable them perform the physical activity, Muscular strength is ability of the muscle or muscle groups to produce maximum force to enable it carryout a physical activity, such as lifting a weight. Muscular endurance is the ability of muscle or muscle group to sustain contraction over a long period of time, for example performing push – ups. Flexibility is the range of movement at a given joint in the body and Body composition is the proportion of body fat to lean tissue.

## 6.0 TUTOR-MARKED ASSIGNMENT

Briefly explain the following

1. Cardio respiratory fitness.
2. Muscular strength/endurance.
3. Flexibility
4. Body composition.

## 7.0 REFERENCES/FURTHER READING

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# MODULE 3 PHYSICAL FITNESS PROFILE

Unit 1 Definition of Physical Fitness Programme
Unit 2 Procedure for Physical Fitness Programme
Unit 3 Classification of Individuals Physical Fitness Status.

## UNIT 1 DEFINITION OF PHYSICAL FITNESS PROGRAMME

**CONTENTS**

1.0 Introduction
2.0 Objectives
3.0 Main Contents
3.1 Definition of Physical Fitness Programme
4.0 Conclusion
5.0 Summary
6.0 Tutor-Marked Assignment
7.0 Reference/Further Reading

## 1.0 INTRODUCTION

In Unit 2 we discussed on the components of Physical Fitness. This unit discusses health components of physical fitness, and physical training activities used in developing and maintenance of physical fitness status of an individual. This unit also focuses on physical fitness profile, collection of personal information and Classification of the Individual's Physical Fitness Status

## 2.0 OBJECTIVES

By the end of this unit, you should be able to:

- briefly explain physical fitness profile
- discuss the procedure and techniques of collection of personal information
- identify the stages/levels of an individual's physical fitness status
- identify exercise to develop each component and to assess it.

## 3.0 MAIN CONTENT

## 3.1 Definition of Physical Fitness Profile

**Definition of Fitness Profile**
Fitness is a broad term that encapsulates different traits and abilities. The definition of fitness to one person may be very different to the next person. For example the marathon runner thinks fitness is your ability to jog. The strongman says it is how much you can lift while someone who is into yoga would suggest it is to do with flexibility and balance.

The different definitions of fitness exist not only between exercise types, e.g. flexibility versus strength training but also within the same category. If you have ever watched the TV show 'Superstars' you would see this. Superstars would have professional athletes from different sports compete in various events. You would see an Olympic cyclist look very average when he was forced to do a jog and vice versa when the Olympic runner was forced to ride on the bike. This is because aerobic fitness is specific to the event you train for.

After spending some time reviewing the general schemes, definitions and performance levels within element of fitness I have brought everything together into a single Fitness Profile. It uses 26 different definitions of fitness to produce an overall picture of exactly where you are at present. This can easily be put into graph form for simple comparisons and the overall average score tells you the state of body.

The measurements classify you on a one to seven ability level, where one is poor and seven is excellent within each category. The goal is not to classify you as good or bad but rather to identify possible weak area and thus understand how best to apportion your training time and focus.

Fitness is also defined as the quality or state of being fit and healthy. Around 1950, perhaps consistent with the industrial revolution and the treatise of World war II, the term "fitness" increased in western vernacular by a factor of ten. The modern definition of fitness describes either a person or machine's ability to perform a specific function or a holistic definition of man's adaptability to cope with various situations. This has led to an interrelation of human fitness and attractiveness that has mobilised global fitness and fitness equipment industries. Regarding specific function, fitness is attributed to persons who possess significant aerobic or anaerobic fitness. A well-rounded fitness program improves a person in all aspects of fitness compared to practicing only one, such as only cardio/respiratory endurance or only weight training.

A comprehensive fitness programme planned for an individual typically focuses on one or more specific skills and on age or health-related needs

such as bone health. Physical fitness can also prevent or treat many chronic health conditions caused by unhealthy lifestyle or aging. Working out can also help some people sleep better and possibly alleviate some mood disorders in certain individuals. Developing research has demonstrated that many of the benefits of exercise are mediated through the role of skeletal muscle as an endocrine organ. That is, contracting muscles release multiple substances known as myokines, which promote growth

## 4.0 CONCLUSION

Aerobic exercise training does not need to be very severe to decrease resting blood pressure. Moderate-intensity exercise, like brisk walking, jogging, or (cycling may decrease blood pressure more than higher intensity training, like running. The most important criterion is not the type of exercise but the frequency of exercise. When exercise is performed almost every day of the week, the decrease in blood pressure can easily be noticed within the first month of training. However, all types of exercise do not have these beneficial effects in lowering blood pressure. Weight training, for example, is not as effective as aerobic exercise in lowering blood pressure, although it develops muscular strength and overall physical fitness.

## 5.0 SUMMARY

Recent technological developments have reduced the physical demands of day-to-day activities, like washing, cleaning and going to work place. Automobiles has made more time available for leisure pursuits. Unfortunately, most of the newfound leisure time is used for sedentary pursuits, whereas human body is designed for strenuous physical activity. This has resulted in the decline of functional ability of the human body. Exercise scientists and health professionals strongly believe that this increased physical inactivity has led to a rise in the incidence of several degenerative disorders, like coronary heart disease, diabetes, hypertension, obesity and overweight, osteoporosis, osteoarthritis, and some forms of cancer, like breast cancer and colon cancer.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Briefly explain physical fitness profile
2. Discuss the procedure and techniques of collection of personal information.
3. Identify the stages/levels of an individual’s physical fitness status.

## 7.0 REFERENCES/FURTHER READING

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# UNIT 2 PROCEDURE FOR PHYSICAL FITNESS PROGRAMME

**CONTENTS**

1.0 Introduction
2.0 Objectives
3.0 Main Content
    3.1 The Procedure for Physical Fitness Programme
    3.2 Collection of Personal Information
        3.2.1 Questionnaire
4.0 Conclusion
5.0 Summary
6.0 Tutor-Marked Assignment
7.0 References/Further Reading

## 1.0 INTRODUCTION

The state of health is a continuum, starting from health and ending in death. This concept of health continuum is presented in figure 1.1. An individual can be anywhere on the path between health and death. On the left side of the continuum is health, the absence of which is death as shown on the right side. Generally, most people suffer from disease before their death. A prolonged period of high-risk behaviours precedes disease. Health is therefore a dynamic state of well-being in which individuals maintain habits that promote health and reduce the risk of disease and premature death.

## 2.0 OBJECTIVES

By the end of this unit, you should be able to:

- define physical fitness programme
- list the procedure for physical fitness**.**

## 3.0 MAIN CONTENT

### 3.1 The Procedure for Physical Fitness Programme

When an individual has decided to take part in active lifestyle through an organised exercise programme, it is not advisable to go to a sport shop and buy all what he/she needs to start to run around for the purpose of promoting health. It is necessary for the individual particularly if above thirty years or has not been active in physical activity for the past twelve months to undergo both medical and physical fitness evaluation

to acquire sufficient information about her/him so that an accurate and safe exercise program can be prescribed.

The data gathered during the first physical fitness evaluation will help in identifying those individuals who are classified as “high or low risk” in terms of health condition. The high risk individuals are those who before deciding to take to active lifestyle through exercise programme have been diagnosed to have one disease or the other which can expose the individual to injury during exercise program the safer and the better. In the process of evaluation, the individual will first go to a nearby medical center where necessary medical examination for safety to take part in exercise programme is conducted and any diseases diagnosed can be cured first, or ensure the safety of the individual on medication to participate in the fitness programme

The individual is considered at high risk if found to have had congestive heart failure, have had acute heart attack at least within the last three months, has suffered any kind of infectious disease particularly connected with respiration at least in the previous one or two months, complains of chest discomfort and severe pain with or without engaging in any physical activity. The individual will also be considered at risk if there has been rise in blood fat and sugar or smokes more than a packet of cigarette per day.

After medical examination, the next step is that of physical fitness examination which involves engaging the individual on exercise stress test for duration not less than 10 – 20 minutes. It is done to determine the extent that the individual can continue to work before beginning to show signs of fatigue. This type of examination can hold in any organised exercise fitness center found in places where experts will be able to offer such service for minimum payment or fee.

At the center. The individual will be given medical history questionnaire to fill which seeks to find out information on personal and family history such as having had health problems as regards heart diseases, or other health risk factors like habit of smoking, much alcohol consumption and current lifestyle patterns. (Active non active). The questionnaire seeks to find out also about feeding habits. Based on this information, the expert at the center discuss with the individual about the result and explains the procedure of the exercise programme and the potential danger that needs to be understood by the individual who is to take part in the exercise program prior to participation. The emphasis at this point is on adequate understanding of the programme and implications by the individual willing to participate in exercise.

The programme director or representative should not hide any part of the information from the individual who wants to start exercise programme and at the same time, he/she should be given the confidence that no part of the information from the questionnaire or discussion will be released to anyone without permission. It should be confidential.

There is always the need to have physical fitness evaluation prior to participation in exercise programme for the purpose of promoting health. Usually, fitness evaluation before participation in exercise programme is recommended as follows:

i. Under 35 years every two years.
ii. 35 – 40 years every year.
iii. And above 40 years every six months.

## 3.2 Collection of Personal Information

During the physical fitness evaluation different methods of collecting information for the purpose of prescribing as earlier discussed are:

### 3.2.1 Questionnaire

Each individual who is to take part in the exercise programme is required to provide information on medical condition, exercise habit, and nutritional habit. The information is used for determining the overall risk of the individual and the kind of exercise to be prescribed.

This testing may have an effect relative to any past or present illness, condition or injury and may affect their participation in, and ability to perform the testing programme.

1) Strength: The amount of tension a muscle can exhibit in one maximal contraction. Two tests that go through the full range of motion, which meets the total body-strength criterion, are the single repetition maximum bench press and leg press.

    a) Procedure:
    i) Estimate the weight that an individual can press in one maximum effort.
    ii) Bench press: Load the weights about one-half of the estimated weight or the following: Male – 2/3 body weight, Female – ½ body weight.
    iii) Leg Press: Weights are loaded to body weight for both males and females.
    iv) Individual is instructed to press the weight once for an easy warm-up.

v) Loading of the weights is increased in ten-pound or more increments to maximum. The first three to four repetitions serve as warm-up lifts in order to prevent injury and to prepare for a maximal lift on the fifth or sixth effort.

vi) Score for this test is the maximum number of pounds lifted in one repetition.

vii) Performance factor is dividing the maximum weight lifted by the body weight of the candidate.

2) Dynamic Strength – Muscular Endurance Testing: The ability to contract the muscle repeatedly over a period. Low muscular endurance indicates inefficiency in movement and low capacity to perform work.

a) Sit-up Test: Indicates the muscular endurance of the abdominal muscle group, an area of important concern.

i) Start by lying on back with knees bend, heels flat on the floor.

ii) A partner holds the feet down.

iii) Subject then performs as many correct sit-ups as possible in one minute.

iv) In the up position, the individual should touch elbows to knees and return to a full lying position before starting the next sit-up.

v) Score is the total number of correct sit-ups.

b) Push-up Test: Measures muscular endurance of the shoulder (deltoids, pectorals and triceps.)

i) Test administrator places his fist on the floor below the subject's chest.

ii) Subject must keep back straight at all times. From the up position, lower himself to the floor until the chest touches the administrator's fist and then push back to the up position again.

iii) Subject repeats push-ups for one-minute non-stop, except in the up position.

iv) Total number of correct push-ups in one-minute is recorded as the score.

3) Flexibility: Flexibility is included in total assessment because of the widespread problems of lower back pain and joint soreness. Flexibility is the range of possible movement in a joint or group of joints. It is necessary to determine the functional ability of all

joints; however, the trunk flexion or the sit-and-reach test serves as an important measure of hip and back flexibility.

a) Procedure:

i) Subject should warm-up slowly by practicing the test.
ii) Subject sits on the floor with legs extended at right angles against a box.
iii) Heels touch the near edge of the box and are eight inches apart.
iv) A yardstick is placed between the legs of the subject and rests on the box with the 15" mark on the edge of the box, short end towards the subject.
v) Subject slowly reaches forward with both hands as far as possible and holds the position momentarily.
vi) The distance reached on the yardstick by the fingertips is recorded.
vii) The best of three trials in considered the flexibility score.

4) Cardiovascular Endurance – Aerobic Power Test: the term "aerobics" was adopted from the term "aerobic" which refers to the type of metabolism utilising oxygen in the production of energy for the body. The 1.5-mile run/walk test is used to determine the efficiency of the cardio-respiratory system.

a) 1.5 Mile Run/Walk

i) An indoor (or outdoor) track is sued, or another suitable running area measured so that exact distances are indicated.
ii) Using a stopwatch to measure time, each participant will run/walk to the best of their ability covering enough laps of the track to measure 1.5 miles. Record each participant's time as they cross the line at 1.5 miles.
iii) Each participant's time will be measured against the data tables using standard norms for the most recent Cooper Protocol and scored accordingly.

b) Important Suggestions

i) Pace to avoid fatigue: practice running and pacing prior to the test.
ii) On test day, refrain from smoking or eating two hour preceding the test.
iii) Allow adequate time for stretching and warm-up exercises.
iv) During the test, time will be called out.
v) Cool down: keep walking for five to ten minutes after the run to prevent pooling of blood in the lower extremities.

c) Water-Related Event – 50-yard swim

i) Subject shall swim without aids.
ii) Subject shall swim 50-yards without stopping.

iii) Subject shall start in the water; may push off and must touch at the turn and the finish.
iv) Not a timed event.
v) Subject must use free-style swim stroke

5) Body Composition: This involves the combination of fat mass and fat-free mass, including fat, bones, muscles, organs, and water. It helps to determine

i. Desirable body fat percent
ii. Desirable body weight

6) Nutritional analysis:

i. Eating habit: Nutrition and hydration (the water you drink) are everyday habits. These habits will affect individual performance during exercise; therefore, most be put under consideration. A healthy diet provides your body with the nutrients it needs. Nutrients are substances in food that the body needs for energy, proper growth and maintenance. What you eat affects not only your health, but also your performance and appearance

ii. General knowledge about nutrition: Food provides energy for physical activity. As you get more active and more fit, and/or as you lose weight, your energy needs (how many calories you need) may change. To get the energy you require, you need to get the proper amount of:
- Protein, which is needed to maintain and rebuild tissues such as muscles.
- Carbohydrate, which is the body's preferred source of energy.
- Fat, which also provides energy.
- Water, to replace water lost through activity.

Eating a diet that is varied, balanced, and moderate can provide you with all the nutrients the body needs without getting too much or too little of any one nutrient.

**Balance** means eating the recommended number of servings from each food group most days.

Variety within each food group (for example, eating different fruits from the fruit group instead of eating only apples) ensures that you will get all the nutrients you need, since no one food provides every nutrient. Eating a wide variety of foods will also help you avoid eating too much of any substance that may be harmful.

**Moderation** means eating a little of everything but nothing in excess. All foods can fit into a healthy diet if you eat everything in moderation.

Those who are very active or who are athletes may have special nutritional needs. They usually don't need more protein than other people, but they do need more carbohydrate (grains, vegetables, fruits) than the amount recommended for the average person. Carbohydrate is stored as ready energy in the liver and muscles, and this supply is used up very quickly during exercise. Endurance athletes (such as runners and cyclists) need a particularly large amount of carbohydrate. The carbohydrate needs to be eaten right before and during exercise, because the body cannot store a lot of carbohydrate. The test required asking participant what the eat and how regular they eat those foods and with that recommendation can be made so as to provide them the strength required during the fitness training.

## 4.0 CONCLUSION

Recent technological developments have reduced the physical demands of day-to-day activities, like washing, cleaning and going to work place. Automobiles has made more time available for leisure pursuits. Unfortunately, most of the newfound leisure time is used for sedentary pursuits, whereas human body is designed for strenuous physical activity. This has resulted in the decline of functional ability of the human body. Exercise scientists and health professionals strongly believe that this increased physical inactivity has led to a rise in the incidence of several degenerative disorders, like coronary heart disease, diabetes, hypertension, obesity and overweight, osteoporosis, osteoarthritis, and some forms of cancer, like breast cancer and colon cancer.

## 5.0 SUMMARY

There are two kinds of physical fitness, one is health-related fitness and the other one is skill-related fitness. Health-related fitness is characterized by the ability to perform daily activities with vigor and is associated with a low risk of chronic disease. Health-related fitness has three main components, which include cardiorespiratory endurance, musculoskeletal, fitness and optimal body composition. Musculoskeletal fitness includes muscular strength and endurance, and flexibility. Skill-

related fitness includes agility, coordination, balance, reaction time, speed and power it is more related to sports skills and has nothing to do with health and disease prevention. It is essential for success in sports like soccer, basketball, tennis and volleyball.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Explain what a nutritional analysis is?

## 7.0 REFERENCE/FURTHER READING

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# UNIT 3 CLASSIFICATION OF INDIVIDUALS PHYSICAL FITNESS STATUS.

**CONTENTS**

1.0 Introduction
2.0 Objectives
3.0 Main Content
- 3.1 Aerobic Endurance ($VO_2$ max)
- 3.2 Principles of Fitness Programme Development.
- 3.3 Sex of the Participant
  - 3.3.1 Age of the Participant
  - 3.3.2 Body Fat Percentage and Desirable Weight
- 3.4 Previous Physical Activity Level
- 3.5 Medical Fitness Level

4.0 Conclusion
5.0 Summary
6.0 Tutor – Marked Assignment
7.0 References/Further Reading

## 1.0 INTRODUCTION

In this unit, when an individual is interested in regular exercise programme, it is important to identify the level of aerobic fitness of the individual. This is possible by giving physical working capacity test, aimed at evaluating initial aerobic fitness and muscular fitness. The results are then interpreted in comparison with normal values.

## 2.0 OBJECTIVES

By the end of this unit, you should be able to:

- briefly explain individual physical fitness status
- identify the classification of physical fitness

## 3.0 MAIN CONTENT

### 3.1 Aerobic Endurance ($VO_2$ max)

| | | |
|---|---|---|
| 1. | Excellent | Above 44 ml/kg. min-$^{1.}$ |
| $^{2.}$ | Good | 36 -44 ml/kg min-1. |
| 3. | Average | 20 – 35 ml/kg min -1 |
| 4. | Poor | Below 20 ml/kg min – 1 |

| | | | | |
|---|---|---|---|---|
| A. | Body Fat Percentage | | Male | Female |
| B. | 1. | Excellent | Below 16 | Below 23. |
| C. | 2. | Good | 15 – 17 | 22 - 24 |
| D. | 3. | Average | 18 – 22 | 25 - 32 |
| E. | 4. | Poor | Above 22 | Above 22 |

| | | |
|---|---|---|
| C | Muscular dynamic Strength (Push ups in one minute). | |
| 1. | Excellent | Above 44. |
| 2. | Good | 26 - 44. |
| 3. | Average | 16 - 25 |
| 4. | Poor | Below 16. |

| | | |
|---|---|---|
| D. | Muscular dynamic Strength. | |
| 1. | Excellent | Above 15. |
| 2. | Good | 10 - 15 |
| 3. | Average | 5 - 9 |
| 4. | Poor | Below 5 |

| | | |
|---|---|---|
| E. | Local Muscular Endurance (Bent Knees sit ups one minute). | |
| 1. | Excellent | Above 34. |
| 2. | Good | 30 - 34. |
| 3. | Average | 24 - 29 |
| 4. | Poor | below 24. |

## 3.2 Principles of Fitness Programme Development.

When an individual is prepared to take part in regular exercise program for whatever reasons, there are certain principles which must be clearly understood, and carefully followed because they serve as basic guides. These principles are very important because they are the basis of selecting appropriate activities for physical fitness development. This includes the initial level of physical state.

When an individual is interested in regular exercise program, it is important to identify the level of aerobic fitness of the individual. This is possible by giving physical working capacity test, aimed at evaluating initial aerobic fitness and muscular fitness. The results are then interpreted in comparison with normal values. For instance, an individual who weight 60kg took physical working capacity test, of 12 minutes run test , which is suggested by Cooper (1968) to test an individual ability to respond adequately and safely to endurance related work. It indicates the functioning of the heart, blood and oxygen consumption. At the end was found to consume a maximum of three (3) liters of oxygen per minute, the oxygen consumption in proportion to the person’s body weight in kilogram is more appropriate to use in knowing initial fitness as regards aerobic capacity.

This indicates the health condition of the heart.

$$V0_2 \text{ ml/kg. min-1} = \frac{VO_2 \text{ max}}{\text{Body weight (kg).}}$$

Remember that one liter of oxygen is the same 1000 milliters of oxygen.

1 liter = 1000ml

3 liters = (3 x 1000) ml

Body weight = 60kg

$$VO2 \text{ ml Ekg. Min -1} = \frac{3000}{60} = 50$$

This individual's maximum oxygen consumption is 50ml 02kg $_{mi\ n}^{-1}$ which indicates the status of the person's aerobic fitness. This result wills determine whether much emphasis should be laid on designing exercise for aerobic fitness development or for maintaining the fitness.

## 3.3 Sex of the Participant

There is no significant psychological difference between male and female counterparts of the same age and similar health conditions in the training effect. But it should however be, noted that the female has smaller heart size which affects their aerobic capacity to perform the same as the males when given the same workload because the heart ejects less volume of oxygenated blood to supply the active muscle tissues. There also evidence to support the differences in aerobic performance because of the percentage of body fat. The females generally have larger proportion than the males of the same age and health condition. Therefore, they became less efficient. The smallness of the female heart size as compared to that of the males affects the amount of blood volume ejected per heartbeat. This consequently is responsible for the higher number of heart rate per minute than that of the male of the same age at rest and during exercise, given the same work lord.

Among the physiological differences between the males and the females are the hemoglobin contents in the blood cells which serves as 'oxygen carriers'. The hemoglobin concentration in females is about 14 grams per 100 milliters of blood as against 15.1 grams per 100 milliliters of blood of the males. This puts the females at a disadvantage because the oxygen supplied to the active muscle tissues during physical activity is less. In both, the content is found to increase by ten percentage during intensive exercise in supplying oxygen.

Some experts however, do not agree with this theory as they argue that the amount of oxygen extracted even during intensive exercise does not increase to the extent that the oxygen needed cannot be provided with the initial hemoglobin content at rest. The female's performance may be affected more because of less muscle size as compared to the male's. It

is not the same number of muscle groups contracting as that of the male counterparts of the same age and weight, given the same workload with females.

### 3.3.1 Age of the Participant

The fact exists that biological aging can be delayed with regular exercise program. However, as an individual grows older, there is decline in certain physiological variables which do affect status of aerobic capacity. These variables such as heart rate, stroke volume, and maximal oxygen consumption associated with cardiovascular fitness decreases with aging.

Generally, an aerobic fitness is at peak by the age of 25 years and begins to decline at about 35 years (The females may be earlier). The decline however, in those individuals involved in regular exercise program is found to be much slower in comparison with those of the same age and sex living a sedentary life style. This shows biological aging is different; an old individual can do as well as the young ones and can benefit from participating in regular exercise program.

### 3.3.2 Body Fat Percentage and Desirable Weight

It is very important to know the percentage of body fat an individual has because most often the health problems the individual may face will have much to do with the percentage, he/she carries around. The amount of body fat helps in identifying how much exercise the individual requires. The skin fold method is often used. It is always available and easy to use to estimate the individual's body fat percentage before engaging in exercise program. As suggested by Smith, Wilmore and Fox (1978) the desirable body weight is calculate after knowing the total body weight in kilogram for both male and female using specific constant, based on the generally accepted average body fat percentage of 16% for males and 23% for females.

The desirable body weight calculated will show the differences in excess that needs to be reduced through exercise program and any other weight reduction method. Below are the different methods of calculating weight on sex grouping.

a. Female $= \dfrac{\text{(Body wt (kg) – (body wt x Fat 96)}}{0.77}$

b. Male $= \dfrac{\text{(Body wt (kg) – (body st x Fat 96)}}{0.84.}$

Examples;

1. A female client was diagnosed to have 30% of body fat and weight 60kg. What will her desirable weight?

   Body weight = 60kg.
   Body Fat = 30.
   Desirable weight = $\frac{60 - (60 \times .3)}{0.77} = \frac{42}{77}$
   = 54.545kg.

Considering other proportions that make the total body weight, 54.545 kilograms is her desirable body weight. Therefore, she needs from this value; exercise program can be prescribed to suit the reduction process.

2. A male client of the same weight 60kg was found to have 20% body fat. What will be his desirable weight?

   Body weight = 60kg
   Body fat = 20
   Desirable weight = $\frac{60 - (60 \times .20)}{84}$kg

   $= 60 - 12 = \frac{48}{84} = 57.143$kg

Similarly, the weight to reduce is the difference between the total body weight of 60kg and the desirable weight 57. 14kg which is 2.85kg. It should however be noted that even though both male and female have the same weight, there is difference in their weight problem. Female and males do have physiological difference as regards the amount of fat deposited. The females usually have higher amount.

## 3.4 Previous Physical Activity Level

Before allowing an individual to participate in any exercise program, the nature of the person's occupation on daily basis for earning a living must to be recognized as an important factor. This information helps in determining the intensity and the type of exercise to be prescribed.

In addition to "stress testing" results which will indicate the level of aerobic capacity, it is necessary that a physical activity questionnaire be given to them, seeking information about the previous level of physical activity . There is an evidence to support decline in oxygen consumption capacity after a long time bed rest or non – participation in exercise. The same was observed of high level of oxygen consumption through the type of work done daily. Therefore, to know the level of individual's physical activity at the initial period helps a lot in selection of the suitable exercise for the individuals.

## 3.5 Medical Fitness Level

For whatever reason given for taking part in regular exercise programme, it is important to have the individual's medical history. This to ascertain types of illness, disease(s) that may be hereditary which need(s) care. Such diseases like hypertension, coronary heart diseases and ventricular disorders could be identified.

## 4.0 CONCLUSION

Conclusively, research shows that most people do not participate in physical activity talk less of making it part of their daily routine. Factors that lead to this unacceptable behavior of exercise participation are constraint of time, transportation to venues of physical education arena (to and fro), equipment, facilities, nonparent support, peer group support, illness or disease contact, no enough official like coaches, and trainers, unfavorable and unsafe environment where safety and security do not prevail. It is therefore, strongly suggested by exercise scientists, and health/fitness professional that individual should exercise three to five times a week of preferable all, these of the week at 50 to 65 per cent of $VO_2$ max or maximum at heart rate between 70 – 85 per cent. In addition its recommended that legislative bodies should strive to pass policies that can make it easy for people to include physical activity within their daily retune to maintain and improve their physical fitness status.

- Physical fitness profile helps to determine the individual's initial fitness level before participating in a physical exercise programme.

- The procedure used in obtaining information shows that a person who decides to participate in physical activity, should not exercise should not start participating in an exercise programme right away but should visit a health facility or fitness center for medical examination. The result will be used to determine if he or she is fit to start a fitness programme.

- When an individual is prepared to take part in regular exercise programme for whatever reason there are certain principles which must be clearly understood, and carefully followed because they serve as basic guides. Example: Initial level of physical fitness status, sex of the participants, age of the participants, body fat percentage and desirable weight. Etc

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Explain physical fitness profile.
2. List techniques for Collection of personal information.
3. Identify exercises to develop components of physical fitness.

## 7.0 REFERENCES/FURTHER READING

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# MODULE 4 PRESCRIBING EXERCISES PROGRAMMES

Unit 1 Prescribing Exercise Programme
Unit 2 Components of an Exercise Session
Unit 3 Selection of an Exercise Programme
Unit 4 Modes of Exercises

## UNIT 1 PRESCRIBING EXERCISE PROGRAMME

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## 1.0 INTRODUCTION

In Unit 3 we discussed Physical Fitness profile. In this unit we will be This unit discusses definition of physical fitness profile, procedure for individual fitness profile, collection of personal information. Classification of individual physical fitness status and principles of fitness program.

## 2.0 OBJECTIVES

By the end of this unit, you should be able to:

- explain exercise prescription programme
- identify the components of an exercise session.
- design exercise programmes for physical fitness.
- discuss the mode of an exercise programme.

## 3.0 MAIN CONTENT

## 3.1 Prescribing Exercise Programmes

When prescribing exercise for an individual who is interested in taking part in regular exercise, he/she should first be given a physical activity questionnaire which contains statements seeking information on medical history, daily exercise habit, types of work done for a living and feeding habits. The questionnaire should provide alternative responses for the clients to choose from. The needs of the individuals must to be considered as very important in promoting health through exercise program. General recommendations for prescription of regular exercise programme irrespective of the initial physical fitness level follow some essential criteria which serve as important guidelines

i. Frequency of the exercise per week:
ii. Intensity of the exercise in the form of workload:
iii. Duration of the exercise session:
iv. Mode of the physical activity:
v. Initial physical fitness level:

### 3.1.1 Frequency of the Exercise per Week

What is very important about prescribed exercise programme is the effectiveness. It has to be done regularly within a week. This is to improve metabolic adaptation of the active muscle tissue that leads to enzymic changes particularly those responsible for energy production:

(a) The body tissues are provided with enough time to respond to regular training.

(b) Related enzymic activities such as those improving fat metabolism are improved

(c) Neuromuscular efficiency increase motor skills acquisition.

(d) Some biochemical changes in the muscle tissue increase adaptation to aerobic endurance.

(e) Lactic acid accumulation decreases during exercise because of short anaerobic phase and the recovery period.

At the beginning of the regular exercise programme, three (3) times per week should be recommended for the individuals in their 50s or above and those who have determined as in poor physical fitness shape. Also

those who have weight problems, heart related diseases or with poor health condition should be exercising two to three times per week. As time goes on with the training, the frequency of the exercise per week can be increase since the muscle tissue would have become more adapted and the recovery period is shortened with no problem from the strenuous work done. The increase in the number of days is to stimulate 'training effects' because as the tissues become more adapted, there is need to overload it. This however, must to be within recognised limits of the desired intensity.

### 3.1.2 The Intensity of the Exercise

When prescribing exercise, it is very important to use the known estimated maximum oxygen uptake of the individual which was obtained from the initial physical fitness test result. It is used in determining the workload which will be appropriate for stimulating training effect. The idea of knowing each individual's $VO_2$ max is important in exercise prescription because it is related to the amount of energy utilisation. Though $VO_2$ max is the most recommended for determining intensity, it is very difficult to use it always because technical problems such as availability of expensive laboratory equipment and trained personnel needed?

An alternative method of estimating maximal oxygen consumption ($VO_2$ max) is the use of heart rate which has been found to have high correlation with the amount of oxygen consumed during exercise. The heart rate at the end of the physical fitness test is used to determine the needed cause "training effect". As recommended by a committee of sports medicine and other health promotion expert (1974) the exercise workload considered appropriate, must range from 60 per cent to 90 per cent of the individual's maximum heart rate (HR max) per minute.

Obtaining the maximum heart rate requires the use of laboratory equipment called Electrocardiograph (ECG), but it is difficult to use because of the administrative inconveniences and financial cost. As such an alternative way of calculating maximal heart rate was suggested by a Swedish Physiologist Karvonen, and called "Karvonen formular". It is used if the age of the individual is known. In estimating heart rate using the Karvonen formula, the age of the individual and resting heart rate have to be known and 220 as a constant number is used, from which the age is subtracted to give the expected maximal heart rate. For example, if an individual is 25 years old, and willing to participate in a regular exercise programme, the maximal exercise heart rate will be calculated from the resting heart rate as follows:

| | | |
|---|---|---|
| Age (Years) | = | 25 |
| Resting heart rate | = | 75 |
| The constant number | = | 220 |
| HR Max | = | (220 – 25) = 195. |

As it was earlier discussed, appropriate exercise intensity is suggested to be between 60 per cent and 90 per cent of the HR max. This individual should therefore be exercising within certain zone which is often called "Training zone".

60% x (HR max – Resting HR) + Resting HR to 90% x (HR max – Resting HR) + Resting HR.
As the case maybe with this individual who is 25 years old, the training zone (TZ) of the workload will be calculated below:

TZ = 0.6 x (195 – 75) + 75 to 0.9 x (195 – 75) + 75
= (0.6 x 120) + 75 (0.9 x 120) + 75
= 72 + 75 108 + 75
= 147 to 183.

This can be adjusted to $\pm$ 10 because of the individual differences from one population group to another. The individual participating in regular exercise programme should be first taught how to count correctly, using the pulse especially when he/she has no history of any disease related to blood circulation. The heart rate should be monitored during the exercise constantly at the end of each 5 – 10 minutes particularly in high risk individuals.

### 3.1.3 The Duration of the Exercise

If the exercise prescribed is to be effective and produce any physiological adaptation, the individual should spend at least 20 – 60 minutes engaging large muscle groups of the body in exercising continuously. The duration of the exercise however, depends on the purpose of the participation and intensity of workload. The method is commonly used when the intensity of the workload is low and the exercise duration is made long especially if aim of participation is to expend more calories. This may be the case with individuals who want to lose body fat. When exercise intensity is high, the time spent should be short. This method is usually not good for recreational participation in exercise programme, however, it can be used for athletics to develop muscular strength,. In general, prescription of exercise for the purpose of recreation should emphasis long duration and low intensity workload because it is important expend more calories during the period. It is required that during an exercise session, the individual should expend

calories as much as 300 kilo calories. The individual should cover an equivalent work output of two – three (2 – 3) miles. one mile is an equivalent of about one hundred kilocalories expenditure.

### 3.1.4 Mode of Physical Activity

When exercise is prescribed for individuals of group of people, it is necessary to consider the type of physical activity. It must be motivating and enjoyable with the facilities and equipment readily available. It is important the mode of physical activity chosen must ensure that large muscle groups are continuously involved during exercise for a period of not less than twenty minutes for any effective result. The mode of physical activities chosen by the individual for exercise programme could be in the form of walking, running/jogging, cycling, swimming, and some selected endurance sports such as Tennis, Squash racket, Soccer, Basketball etc.

### 3.1.5 Initial Level of Physical Fitness

When prescribing exercise for individuals the initial level of physical fitness must be known. It is usually determined by the physical fitness evaluation. This information is used to estimate the intensity of the workload, duration and frequency of the exercise prescribed. It helps to stimulate appropriate training effect, prevent condition that may cause injuries because is higher than normal workload. Too much workload can make individuals to become disinterested in the programme and result in many drop outs.

**Health benefits of exercise programmes**

An exercise programme that is tailored specifically to your needs is a great way to stay physically and mentally fit. It also provides additional benefits such as:

- improved condition of the heart and lungs
- increased muscular strength, endurance and motor fitness
- increased aerobic fitness
- improved muscle tone and strength
- weight management
- better coordination, agility and flexibility
- improved balance and spatial awareness
- increased energy levels
- improved immunity
- increased physical confidence
- reduced risk of chronic disease (such as type 2 diabetes and heart disease)

- improved sleep
- improved brain function and health
- improved general and psychological wellbeing
- greater self-confidence and self-esteem
- Improved social life.

**Guidelines for exercise programme**

Before you get started, if you are new to exercise or are coming back from a long period of inactivity, it will help if you:

- Complete the adult pre-exercise screening tool questionnaire developed by Fitness Australia, Exercise and Sports Science Australia and Sports Medicine Australia.
- If you answer yes to some of the questions in the screening tool, see your doctor or allied health professional.
- Assess your current fitness level using the following information, or make an appointment with an exercise professional for a fitness assessment.

**Assessing your fitness level for an exercise programme**

You probably have some idea of how fit you are. However, assessing and recording baseline (starting) fitness scores can give you benchmarks (points of comparison) against which to measure your progress. It's valuable to assess your progress on a regular basis, for example each month. Remembering progression with some goals may be achieved in shorter or longer periods of time.

**Before you start your new exercise programme, record:**

- your pulse rate (heart rate) before and after a walk
- how long you take to walk a certain distance
- how many bench push-ups or squats you can do in 30 seconds
- your waist circumference (measured midway between the top of your hip bone and bottom of your ribs).
- your body mass index (BMI). This is calculated by dividing your weight in kilograms by your height in meters, squared. If you would like this accurately assessed, visit your local registered allied health or exercise professional.

(Note: Some medications affect your heart rate. If you are taking any medications that do so, consult a health professional and consider another way of measuring your exertion levels, such as the Borg scale.)

The adult pre-exercise screening tool contains exercise intensity guidelines, including exertion and other descriptive measures.

Consult an exercise or health professional to help you interpret this information or to do a fitness assessment for you, and work out what sort of programme is best for you.

**Designing your fitness programme**

Consulting an exercise professional when designing your fitness programme can help you reduce injury and customise your programme to your needs, especially if you are new to exercise or you haven't done any physical activity for a while. Points to keep in mind when designing your program include:

- Consider your goals. Are you starting a fitness programme to lose weight or for some other reason?
- Think about your likes and dislikes. Choose activities you will enjoy.
- Plan a logical progression of activity. If you're just beginning to exercise, start cautiously and progress slowly.
- Build activity into your daily routine. Schedule time to exercise as you would any other appointment.
- Think variety. By varying your activities (cross-training), you can avoid exercise boredom.
- Allow time for recovery after exercising and make sure you have an adequate healthy diet.
- Put it on paper. A written plan can encourage you to stay on track.

**Assemble your exercise clothing and equipment**

Be sure to pick shoes designed for the activity you have in mind, as well as for your foot type. If you're planning to buy gym equipment, choose something that's practical, enjoyable and easy to use.

Getting started on your exercise programme

When you are ready to start getting active:

- Start with low intensity activities such as walking with a friend or family member.

- Over time, build up to the amount of physical activity recommended by Australia's Physical Activity and Sedentary Behavior Guidelines:

    - Be active on most (preferably all) days every week.
    - Accumulate 2½ to 5 hours of moderate intensity physical activity or 1 ¼ to 2 ½ hours of vigorous physical activity, or an equivalent combination of both moderate and vigorous activities, each week.
    - Do muscle strengthening activities on at least two days each week.

If you are unsure about any of the above, seek help from an exercise professional. Recognised industry associations such as Fitness Australia hold a directory of Australian registered exercise professionals, where you can search for an exercise professional based on their:

- level of experience working in the industry
- delivery, knowledge and skills
- location.

Remember to:

- Start slowly and build up gradually.
- Break activities up if you have to.
- Be creative – include other activities such as walking, cycling, swimming or dancing in your routine.
- Listen to your body – don't push yourself too hard.
- Be flexible – if you're not feeling good, give yourself permission to take a day or two off.

Assess your progress six weeks after you start your programme (by measuring the same parameters as you did to record your baseline fitness) and then every eight to 12 weeks. You may need to adjust the time, intensity and type of exercise you do to continue improving. On the other hand, you may be pleasantly surprised to find that you're exercising just the right amount to meet your fitness goals. If you start to lose motivation, set new goals or try a new activity. Exercising with a friend or taking a class at a local fitness centre may help.

## 4.0 CONCLUSION

In conclusion, you may need to adjust the type of exercise you do to continue improving. You will be surprised to find that you're exercising just the right amount to meet your fitness goals.

## 5.0 SUMMARY

In summary, there is need to consult an exercise or health professional to help you do a fitness assessment, and work out what sort of programme is best for you.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Prescribe one exercise and practicalised it

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# UNIT 2 COMPONENTS OF AN EXERCISE SESSION

## CONTENTS

1.0 Introduction
2.0 Objective
3.0 Main Content
3.1 Components of an Exercise Session
4.0 Conclusion
5.0 Summary
6.0 Tutor – Marked Assignment
7.0 References/Further Reading

## 1.0 INTRODUCTION

Participation in moderate to-vigorous regular physical activity has been generally increasing around the world. While this increase has been very significant in industrialised countries, it has been very slow in developing countries Nigeria inclusive. In the U.S, for example, the proportion of people aged six years and above, who do not engage in any regular physical activity, is reducing to 1.5 per cent? This segment of population is not reducing even to 95 per cent in developing countries. There is therefore a challenging task to educate and motivate people to incorporate regular exercise as an essential part of their lifestyles. An attempt is made in this chapter to highlight the risk factors associated with diseases due to sedentary lifestyle, the role of exercise in the prevention of disease and promotion of health, the definition of health and fitness and guidelines for exercise to improve health.

## 2.0 OBJECTIVES

By the end of this unit, you should be able to:

- define exercise
- identify the components of exercise session

## 3.0 MAIN CONTENT

### 3.1 Components of an Exercise Session

When exercise has been prescribed following the recommended guidelines, the next most important step to take is the implementation of the exercise by seeing the individuals participates successfully in the programme. The exercise duration as earlier discussed, should take at

least 20 – 60 minutes. This is divided into four components in which different exercise are done to help stimulate physiological adaptation:

i. **Warm up Exercise**
This involves those exercises which primarily increase muscle temperature in preparation for the chosen physical activity, coming up next. It may involve practicing motor skills related to the chosen physical activity. The exercise should be of low workload, not exhaustive. This takes about ten (10) minutes calisthenics exercise.

ii. **Muscular Conditioning**
This is the next stage which forms an important component. It helps in improving muscular fitness; takes about 10 – 20 minutes doing exercise which improves/maintain muscular strength, local endurance and joint flexibility.

**iii. Aerobic Conditioning**
This is a major component of the exercise session and takes longer period of 20 – 40 minutes with emphasis on exercise. This involves large muscular groups. It helps in improving cardio respiratory fitness. Modes of the physical exercise include running, walking, jogging, riding bicycle and some selected sports which area characterized by endurance

iv. After an intensive continuous exercise, there is need to spend another five to ten (5 – 10) minutes to do some light exercise in restoring the body tissue to the pre – exercise condition. Active recovery process is found to be more useful than the passive recovery method because it helps to remove lactic acid accumulated during the exercise as soon as possible therefore preventing muscle soreness or strain.

**SELF-ASSESSMENT EXERCISE**

i. Discuss the adaptability of the recommended guidelines for prescribing exercise for individuals from personal experience with those physical fitness centers/clubs you have visited in your area.

## 4.0 CONCLUSION

Recent technological developments have reduced the physical demands of day-to-day activities, like washing, cleaning and going to work place. Automobiles has made more time available for leisure pursuits. Unfortunately, most of the newfound leisure time is used for sedentary

pursuits, whereas human body is designed for strenuous physical activity. This has resulted in the decline of functional ability of the human body. Exercise scientists and health professionals strongly believe that this increased physical inactivity has led to a rise in the incidence of several degenerative disorders, like coronary heart disease, diabetes, hypertension, obesity and overweight, osteoporosis, osteoarthritis, and some forms of cancer, like breast cancer and colon cancer.

## 5.0 SUMMARY

There is awareness today of the benefit of regular aerobic exercise to health, particularly as one of the preventive approaches to medicine. However, reports from various organisations indicated large numbers of sedentary individuals worldwide who are still physically inactive. The current levels of physical inactivity are partly due to insufficient participation in physical activities during leisure time and increased sedentary behaviour during occupational and domestic activities. Thus, physical inactivity has become one of the most important public health problems of the 21st century. This does not deny the relevance of other health issues, like healthy nutrition, smoking abstinence; cessation programmes and evidence based preventive medical care.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Define exercise
2. Identify the components of exercise session

## 7.0 REFERENCES/FURTHER READING

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# UNIT 3 SELECTION OF AN EXERCISE PROGRAMME

**CONTENTS**

1.0 Introduction
2.0 Objectives
3.0 Main Content
3.1 Selection of an Exercise Programme
4.0 Conclusion
5.0 Summary
6.0 Tutor-Marked Assignment
7.0 Reference/Further Reading

## 1.0 INTRODUCTION

In Unit 2 of this module we discussed on the components of physical fitness. This unit discusses health components of physical fitness, and physical training activities used in developing and maintenance of physical fitness status of an individual. This unit also focuses on physical fitness profile, collection of personal information and Classification of the Individual's Physical Fitness Status

## 2.0 OBJECTIVES

By the end of this unit, you should be able to:

- briefly explain physical fitness profile
- discuss the procedure and techniques of collection of personal information.
- identify the stages/levels of an individual's physical fitness status
- identify exercise to develop each component and to assess it.

## 3.0 MAIN CONTENT

### 3.1 Selection of an Exercise Programme

The concept of exercise prescription for one reason or the other has been in existence since the period of simple traditional technology. In Chinese communities like many early communities of the world, they practiced exercise prescription in the form of medical gymnastics activities. In Rome, over two thousand (2000) years ago, there was evidence that a physician called Galen prescribed exercise for his patients to improve their health. Dr. Dudley Sergeant in early 20th century when he was

director at Harvard College Medicine designed exercise for those identified as weak students.

Recently, research results have similarly shown that physical inactivity has relationship with an increased in circulatory and metabolic related diseases involving different groups of people worldwide. The cause has been attributed to automation and technological development which leads to more sedentary life among people of all population.

The advantages of exercise prescription before regular exercise participation are many. The most important precaution like that of drug prescription is the prevention of the harmful “side effects” Sate exercise prescription will promote health both in terms of aerobic and muscular fitness.

Usually, the amount of oxygen uptake is determined in the exercise laboratory. This involves sophisticated, expensive equipment and technically trained individuals. But, these methods have very slow and time consuming. Therefore, some field’s methods have been suggested based on their higher correlation with available laboratory methods. Also, the maximal heart rate is used as an immediate safe method because of high correlation with oxygen consumption as the workload increases.

## 4.0 CONCLUSION

Exercise training increases blood volume. Inactive people have about: five litres, trained people about five and a half litres and elite athletes six litres of blood. During exercise, blood is diverted away from inactive organs, like kidneys and intestines to muscles. At rest, only one fifth of the blood pumped by the heart goes to the muscles. This increases to three-fourths during strenuous prolonged exercise. Regular exercise training increases blood flow to the exercising muscles by opening more of their capillaries and diverting blood from inactive organs. This is made possible because blood vessels, which are made of smooth muscle, become fit with training and can constrict and dilate better to send blood to where it is needed most.

## 5.0 SUMMARY

Exercise training increases blood volume, which makes the body better equipped to divert blood to muscles and skin to supply nutrients and oxygen, to eliminate waste products and to dissipate heat. As the blood gives up fluid in the skin to produce heat, and to the muscles to make them contract better, it becomes thicker. Similarly, as the trained heart

becomes bigger and stronger to pump more blood for every heat, muscles become more capable to extract and use oxygen at a higher rate than in untrained condition. The higher V02 max found in endurance trained individuals is thus due to a greater cardiac output and a greater oxygen extraction capacity of the muscles.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Define exercise prescription
2. Identify the guidelines for exercise prescriptions

## 7.0 REFERENCES/FURTHER READING

Chu, D.A. (1996). Explosive power and strength. Campaign, IL: Human kinetics

Fleck, S.J. & Kraemer, W.J. (1997). Designing resistance training programmes, (2nd ed.). Champaign, IL: Human kinetics.

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# UNIT 4 MODES OF EXERCISES

## CONTENTS

1.0 Introduction
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3.0 Main Content
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## 1.0 INTRODUCTION

Recent technological developments have reduced the physical demands of day-to-day activities, like washing, cleaning and going to work place. Automobiles has made more time available for leisure pursuits. Unfortunately, most of the newfound leisure time is used for sedentary pursuits, whereas human body is designed for strenuous physical activity. This has resulted in the decline of functional ability of the human body. Exercise scientists and health professionals strongly believe that this increased physical inactivity has led to a rise in the incidence of several degenerative disorders, like coronary heart disease, diabetes, hypertension, obesity and overweight, osteoporosis, osteoarthritis, and some forms of cancer, like breast cancer and colon cancer.

## 2.0 OBJECTIVES

By the end of the unit, you should be able to:

- define mode of exercise
- list the types of exercise
- mention examples of types of exercise

## 3.0 MAIN CONTENT

### 3.1 Modes of Exercises

Comparing the results of laboratory and field tests involving thousands of different populations varying in age, sex, training conditions, lifestyle and standards were established and categorised according to sex, weight, and age. The standards are used for energy requirement or expenditure during exercise. Since for the purpose of recreation and health

promotion, the mode of physical activity used are either Walking, Running, or Cycling. It is now possible to estimate the maximal oxygen consumption from these physical activities by applying the suggested formulae which were derived after several years of comparative laboratory and field test results.

1. **Walking Exercise**

Walking, especially when fast is considered as a very appropriate mode of physical activity. It should be performed at the rate of 50 – 100 meters per minute for a period of not less than 20 minutes continuously during each exercise session. When an individual is to take part in walking as a regular exercise, horizontal land surface is preferable because energy cost varies on uphill or downhill, and since the equation for estimating maximal oxygen consumption is based on horizontal land surface, it will not be correct if such is not used. The speed is very important during walking exercise because at the end, the total distance covered within the given duration is considered for example, if an individual can walk a distance of 1600 in meters (1.6km) in 20 minutes, the average speed of the individual must be calculated first.

The formulae for estimating the amount of oxygen consumption depends on the speed per minute. The weight of the individual is not an important factor in this case because necessary correction for body weight has been effected. Thus, the amount of $VO_2$ max for this individual is calculated below:

Distance covered = 1600m
Duration of Exercise = 20 minutes
Speed (m/min.) = $\frac{1600}{20}$ = 80m/min

$VO_2$ max = m/min x 0.1m/$O_2$/kg + 3.5m/$O_2$/kg. Min/sec

VO2 max = 80 x 0.1 + 3.5 ml $O_2$/kg. Min/sec

= 8.1 + 3.5 ml$O_2$/kg . Min/sec

= 11.6ml/$O_2$/ kg. Min

At 11.5ml $O_2$/kg. Min/sec the individual is not walking hard enough. H/she should be able to cover the distance five (5000m) kilometers in 30 minutes. If this individual is a male and weighs 60kg, it will then mean that the total oxygen consumption to

complete the exercise is (11.5 x 60)ml of oxygen = 690ml of oxygen which is too small since he can consume as much as 3000ml of oxygen per minute. Remember when an individual walks at 1.6km per hour, the person is moving at the rate of about 26.7 meters/minute. Therefore, at 80 meters/minute the speed per kilometer of this individual.

$$= \frac{80}{26.8} \quad 2.996 \text{ km/hr}$$

$$= 2.996 = 3\text{km/hr.}$$

About 3km/hour is too slow. For effective exercise, it should not be less than 3.5 km/hour for duration of 20 minutes.

**2. Running Exercise**

To involve in running exercise, the individual is expected to be moving on horizontal land surface at the rate not less than 134 meters per minute (18km/hour). This should be continuous for duration not less than 20 minute apart from the warm up duration. During the exercise, the amount of oxygen utilised is estimated by knowing the distance covered within the time given. Supposing an individual ran a distance of 400 meters within 20 minutes, the maximal oxygen consumption will be calculated using the suggested formulae of m/min x 0.2 $mlO_2$/kg, min + 3.5 $mlO_2$ /kg , min. Thus, the $VO_2$ max to complete 800 m within 20 minute is as calculated below

| | | |
|---|---|---|
| Distance run | = | 4000m |
| Duration | = | 20 minute |
| Speed | = | $\frac{4000\text{ m}}{20}$/min |
| | = | 200 m/min |
| $VO_2$ | = | (200 x 0. 2) = 3.5 $mlO_2$ /kg min/sec |
| | = | 40.0 $mlO_2$/ kg min. |

This individual is adequately exercising and the physical fitness level is good.

If this individual weights 60kg and used about 43.5 $mlO_2$ per kg., the total oxygen utilised will be (43.5 x /60) $mlO_2$ = 2610 $mlO_2$ = 2.51 liters of oxygen per minute. Remember this method of calculation has no age specificity; it is to all sexes of every

population. But it is advised that this formula should not be used for well-trained athletes; they do not belong to the general population because of the specialised training.

### 3. Bicycle Ergometer

It would be possible to estimate VO2 max when an individual rides a stationary cycle and work rate is between 300 – 12kgm/min/sec at a selected constant revolution per minute. Nowadays, it is not very difficult to have stationary bicycle ergometer for exercise at home. The problem is lack of metabolic equipment for measuring the amount of oxygen utilised during the exercise. Based on the amount of the final workload VO2 max can be estimated by using the following formulae:
VO2 max = kg/m x 2.0 + 300 mlO2.

For example when an individual rides a bicycle for exercise, and the amount of workload is continuously increased every five minutes until a maximal of 1000kg. Meter/min. at exhaustion, VO2 max can be calculated

| | | |
|---|---|---|
| Final Work rate | = | 100 kg. m/min/sec |
| VO2 max | = | 1000 x 2.0 + 300 mlO2 |
| | = | 2000 + 300 |
| | = | 3200 mlO2. |

If the individual weighs 60kg, the amount of oxygen per kilogram of body weight per minute

will be $\frac{2300}{60}$ = 38. 33 mlO2/kg.

VO1 max = 38. 33 mlO2/kg min/sec.

In some situations, the Arm ergo meter is used in this case a different formula is available to calculate the VO2 max if the work rate is between 150 170kg. M/min/sec at constant revolution. VO2 max is calculated by multiplying the final workload with the suggested constant as follows:

VO2 max = (kg/m/min x 3.0) + 300 mlO2 min/sec. For example, an individual who arm cranked for a period of 20 minutes with workload gradually increased until exhaustion at 700kg meter/min/sec. The amount of oxygen consumed to perform the work will be calculated as follows:

| | | |
|---|---|---|
| Final Work rate | = | 7000 kg/min |
| VO2 max | = | Kg/meter/min x 3.0 + 300 mlO2 |
| VO2 max | = | 700 x 3.0 + 300 mlO2 |
| | = | 2100 + 300 mlO2 |
| | = | 2400 ml = 2.4 liters of O2 |

If the individual weights 60kg, the amount of O2 consumed per kilogram body weight per minute.

= 2400 mlO2/kg. min
= 40 mlO2/kg. min/sec

**4. Harvard Step Exercise**

In some exercise centers, individual can exercise on stepping up and down on a specially constructed box of 20 inches high (58cm) for males, and 18 inches high (50cm) for females. At the end, the number of steps per minute is considered for the calculation of $VO_2$max. The suggested formula is the number of steps/min x 0.35ml$O_2$ kg. Min/sec. For example, an individual who finished stepping exercise at the rate of 60 steps per minute, the oxygen consumption will be calculated as follows:

| | | |
|---|---|---|
| Final Steps per minute | = | 60 |
| $VO_2$ max | = | steps/min x 0.35 ml/kg. min/sec |
| $VO_2$ max | = | (60 x 0.35) ml/kg. min/sec |
| | = | 21 ml/kg. min/sec |

At this stage, it will be seen that different modes of physical activity have been for regular exercise. The formulae for estimating maximal oxygen consumption from these methods do not involve expensive laboratory equipment. Though this cannot be always an alternative to more reliable laboratory methods it helps to save time and provide a valid estimate of the oxygen consumed.

As indicated earlier, different modes of physical activity can be used to establish an individual's physical fitness status which can be classified as excellent, good or poor. The amount of oxygen consumed can be converted into another energy expenditure quantity described as "metabolic equivalent" (MET). 1 MET is equal to 3.5ml$O_2$/kg. min/sec. The intensity of exercise is prescribed by determining a specified percentage of the individual's functional capacity as reflected by obtained maximal

oxygen consumption. The American College of Sports medicine (ACSM) Committee on exercise prescription (1985).

**SELF-ASSESSMENT EXERCISE**

1. Discuss the adaptability of the recommended guidelines for prescribing exercise for individuals from personal experience with those physical fitness centers/clubs you have visited in your localities.
2. Define Exercise Prescription.
3. List the Components of an Exercise Prescription.
4. Identify the criteria for an exercise program.

## 4.0 CONCLUSION

Regular Exercise programme participation is an integral part of one's individual health. Therefore, when prescribing exercise for an individual who is interested in taking part in regular exercise, he/she should be given a questionnaire which contains statements seeking information on medical history, daily exercise habit, types of work done for a living and feeding habits. This would go a long way in guiding the exercise scientist to prescribe the exercise in accordance to the needs and aspiration of the client. Additionally, it greatly assists in the realisation of the desired goals and objective for taking part in the exercise.

## 5.0 SUMMARY

In this unit we have leant the following:

i. Exercise prescription is an important area in health promotion and maintenance of one's physical fitness.
ii. That exercise prescription is guided by observing its basic components which assist in achieving desired objectives.
iii. Each exercise programme is designed to achieve a particular goal or objective. Therefore, individuals placed on a programme that suites the desired objective.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Define exercise prescription programme.
2. List the components of an exercise session.
3. Identify the criteria for selecting an exercise programme.
4. Explain mode in exercise prescription programme.

## 7.0 REFERENCES/FURTHER READING

American College of Sports Medicine: Guideline for exercise testing and prescription. (3rd ed.). Leas and Febiger, Philadelphia. P. A. 1986

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