CHARLES UNIVERSITY IN PRAGUE

FACULTY OF PHYSICAL EDUCATION AND SPORT

EVALUATION OF HEALTH RELATED PHYSICAL FITNESS OF ELEMENTARY SCHOOL STUDENTS IN LIBYA

Doctoral Thesis

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Prague, 2012

I declare that this is my personal work which I elaborated using the literature listed. Neither this work, nor any significant part, has been used to gain any other or similar academic title.

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Shukri Bennanis, Prague,

ACKNOWLEDGEMENTS

I would like to thank Assoc. Prof. Dagmar Pavlu, for accepting to be my thesis supervisor and allowed me to pursue this particular area of research and having shown continued interest and enthusiasm during the course of writing of this thesis. Her numerous publications and her experience have been of great help and inspiration. I would also like to express my gratitude to the members of my thesis committee. I would like to thank Doc. MUDr. Jan Heller, CSc., Prof. Ing. Václav Bunc, CSc., Prof. MUDr. Miroslav Kučera, DrSc., Prof. RNDr. Jan Hendl, CSc., PhDr. Mario Buzek, CSc., Doc. PhDr. František Táborsky, CSc., Prof. Ali Fituri for his encouragement, and advice during the course of the doctoral program.

Many thanks are due to PhDr. Marta Hrušková and a great thank to Ing. František Lopot, and the secretaries, and all PhD Students in the physiotherapy department.

My utmost and great gratitude thanks and love are extended to my wife, who has shown great patience during many hours spent in the research and writing phases of this thesis, and who ultimately gave me the encouragement, and her full support to pursue the course of doctoral study and research, even the final destination.

Abstract

Title: Evaluation of health related physical fitness of elementary school students in Libya.

Aims: Evaluating the elements of physical fitness related to health of students of elementary education of Libya, and comparing their level with students of other countries according to the availability of data.

Methods: Statistical survey and comparative analysis.

Results: The researcher used a set of fitness tests related to health using the presently implemented physical fitness test battery to get results to present the realistic outcomes to officials who take care of physical activity, which is one of the bases of health as we know.

This research identifies the current health-related fitness levels of students in (Aljmeel, Regthaleen, Zwara) school district and suggests cultural differences that may influence that fitness status, and discussed four the evaluating of elements of physical fitness related health, cardiorespiratory endurance, muscular strength, flexibility and body composition which measured by 1 mile run, sit up test, sit and reach and skinfold caliper. The study showed that the mean and std were: height, weight, cardiorespiratory, muscular strength, flexibility and skinfold are (141.832 ± 9.405), (42.398 ±10.592), (10.957 ± 1.579), (20.045 ± 11.690), (13.865 ± 6.024), skinfold is (17.546 ± 9.973) respectively. Also, there was significant differences relate to the factor city and how it affected muscular strength ($p \leq 0.05$), (0.009) for which the mean value was (17.77±10.006) and how it affected skinfold ($p \leq 0.05$) for which the mean value was (0.05), (16.12±8.568) in favor to Zwara district. On the other hand there were no significant differences by the other factors on the other elements.

Also, it noticed that is a completely different between Libyan students

and their counterpart from US in components of health related physical fitness in favor to US, that refer to the differences between developed country and less developed country

Keywords: Fitness, Physical fitness related health, body composition, flexibility, muscular strength and endurance, health, field testing

Abstrakt

Název: Hodnocení zdravotně orientované zdatnosti studentů základní školy v Libyi.

Cíle: Hodnocení prvků fyzické zdatnosti studentů základní školy v Libyi a porovnání jejich úrovně se studenty jiných zemí na základě dostupných dat.

Metody: Statistický výzkum a srovnávací analýza.

Výsledky: Badatel pracoval se sadou fitness testů vztahujících se ke zdraví s použitím nově zavedené sady fyzických testů, aby dosáhl výsledků a mohl prezentovat reálné výstupy odborníkům, jež se zabývají fyzickým cvičením jakožto jedním ze základů zdravého životního stylu.

Tento výzkum rozpoznává současnou úroveň zdravotně orientované zdatnosti studentů ve školních oblastech (Aljmeel, Regthaleen, Zwara) a naznačuje kulturní rozdíly, jež mohou ovlivnit tento fitness statut, a hovoří o čtyřech hodnotících prvcích zdravotně orientované zdatnosti, a to kardiorespiratorní zdatnost, svalová síla, flexibilita a tělesná skladba, jež jsou měřeny během na 1 míli, sklapovačkami, analýzou flexibility a měřením tloušťky kožní řasy kaliperem. Studie ukázala, že průměr a směrodatná odchylka byly následující: výška, šířka, kardiorespiratorní zdatnost, svalová síla a flexibilita jsou (141,832 ± 9,405), (42,398 ±10,592), (10,957 ± 1,579), (20,045 ± 11,690), (13,865 ± 6,024) a kožní řasa je (17,546 ± 9,973). Dále byly zjištěny zásadní rozdíly vztahující se k city faktoru a jak toto ovlivnilo svalovou sílu ($p \leq 0,05$), (0,009), pro niž platil průměr (17,77±10,006), a kožní řasu ($p \leq 0,05$), pro niž platil průměr (0,05), (16,12±8,568), což se vztahuje k oblasti Zwara. Na druhé straně nebyly zjištěny žádné zásadní rozdíly ostatních faktorů ve vztahu k jiným prvkům.

Také bylo vypozorováno, že zdravotně orientovaná zdatnost libyjských studentů ve srovnání s jejich protějšky ze Spojených států je dosti odlišná,

což odráží rozdíly mezi vyspělými a méně vyspělými státy.

Klíčová slova: Fitness, zdravotně orientovaná zdatnost, tělesná skladba, flexibilita, svalová síla a výdrž, zdraví, testování v praxi

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AAHPERD: American alliance for health, physical education, recreation and dance.

HRF: Health related fitness.

cm: Centimeter.

mm: Millimeter**.**

HRF: Health related fitness.

BMI: Body mass index.

PE: Physical education.

DPA: Daily physical activity.

CCHS: Canadian community health survey.

CFLRI: Canadian fitness and lifestyle research institute's.

HBSC: Health behavior in school-aged children.

WHO: World health organization.

CDV: Cardiovascular disease.

ACSM: The American College of Sports Medicine

EU: European Union.

ATP: Adenosine triphosphate.

CHD: Coronary heart disease.

ROM: Range of mobility.

ANOVA: Analyze of variance.

CPAFLA: The Canadian physical activity, fitness and lifestyle appraisal.

NIDDK: National institute of diabetes and digestive and kidney diseases.

GCSE: General Certificate of Secondary Education.

PCPFS: The President's Council on Physical Fitness and Sports.

MNT: Medical news today.

Ophea: Ontario physical and health education association.

Chapter 1: Problem

1.1 Introduction

Physical education is a necessity for the health and well-being of every student. As a unique and essential part of the total education program, physical education can significantly enhance all aspects of development including health, physical fitness, movement knowledge, academic performance, goal setting, self-esteem, and social skills. Evidence continues to mount that regular physical activity can prevent and manage coronary heart disease, which is the leading cause of death. Researches finding clearly demonstrate that daily exercise, from early childhood throughout life, is a primary factor in maintaining health and enriching that quality of life. People begin to acquire and establish patterns of health-related behavior during childhood and adolescence. Schools are an efficient vehicle for providing this physical education instruction. Although many students participate in extra-curricular athletics, and these programs may meet the movement and exercise needs of the participants during their season of competition, such programs do not accommodate all a comprehensive education and must be included on daily basis. Finally, it should be understood that quality physical education is predicated upon having competent, dedicated, and knowledgeable teachers who utilize appropriate instructional techniques, strategies, and assessments. Physical education is important for the health and well being of people of all ages. It is enjoyable, builds self-confidence and improves ones health and fitness. Specific sports skills are developed in individual as well as team sports. Students experience a variety of lifetime and recreational activities.

In 2009, Faktor study showed there is surely evidence supporting regular physical activity participation in the primary and secondary prevention of numerous chronic diseases. Physical inactivity is a principle risk factor for cardiovascular disease and an increasing a set of chronic hypokinetic (inadequate movement or activity) diseases, including: obesity, diabetes mellitus, cancer (breast and colon), bone and joint diseases (osteoporosis and osteoarthritis), depression, and hypertension. (p. 1)

At the same time, reports which make a relationship between increased physical fitness and physical activity with reduce the cardiovascular diseases' and all-cause mortality have stimulated scientific interest in the assessment of both fitness and activity. Several reports have discussed and recommended methods designed to obtain reliable and valid data on activity and fitness. (Murphy et al, 1988). (p. 708)

On the other hand, our society now is undergoing an important period of serious and performance, and physical education like other sciences help in rising the physical efficiency of members of the society, whether children or youth, and sportive activities are the pillar of healthy life and performing them help improve the quality of our life where we could live a happy sound life enjoying good health.

Maud & Foster (2006) study found that a regular physical activity or fitness, a high level of cardiorespiratory fitness and the maintenance of normal weight are strongly associated with several positive health outcomes across the lifespan. Tammelin (2003) study will goose (1961) has defined physical fitness as “a capacity for sustained physical activity”.

In addition, health related physical fitness involves of physiological functioning that promotes good health and provides the resources for individuals to successfully perform their daily activities without undue fatigue. Most authorities agree that this involves cardiovascular function, strength, muscular endurance, and flexibility. Level of fatness is another important indicator of overall health related fitness. (Jerry et al., 1988). (p. 33)

According to Stiehl et, al (2008) study refer that physical activity is bodily movement of any type and many include recreational, fitness, and game or sport activities such as jumping rope, lifting weights, or playing soccer, as well as daily activities such as walking to the store, taking the stairs, or raking leaves. Physical education, on the other hand, must provide learning opportunities, appropriate instruction, meaningful and challenging content.

Both physical activity and physical education are important because each contributes to the development of healthy, active individuals. (p.6)

According to Almaiuof study (2004) showed that health-related physical education curriculum can provide students with substantially more physical activity during physical education classes. In turn, improved health and well-being have significant positive consequences for both individuals and society as a whole. The scientific and empirical evidence is indisputable lifelong participation in physical activity have a significant positive impact on people health and well-being. (p. 2)

Physical education is a necessity for the health and well being of every student. As a unique and essential part of the total education program, physical education can significantly enhance all aspects of development including health, physical fitness, movement knowledge, academic performance, goal setting, self-esteem, and social skills. Evidence continues to mount that regular physical activity can prevent and manage coronary heart disease, which is the leading cause of death. Researches finding clearly demonstrate that daily exercise, from early childhood throughout life, is a primary factor in maintaining health and enriching that quality of life.

People begin to acquire and establish patterns of health-related behavior during childhood and adolescence. Schools are an efficient vehicle for providing this physical education instruction. Although many students participate in extra-curricular athletics, and these programs may meet the movement and exercise needs of the participants during their season of competition, such programs do not accommodate all a comprehensive education and must be included on daily basis. Finally, it should be understood that quality physical education is predicated upon having competent, dedicated, and knowledgeable teachers who utilize appropriate instructional techniques, strategies, and assessments. Physical education is important for the health and well being of people of all ages. It is enjoyable, builds self-confidence and improves ones health and fitness. Specific sports skills are developed in individual as well as team sports.

1.2 Statement of the problem

First of all, the matter of physical fitness started to draw the attention of many countries of the world after the machine became nearly everything in human life, which had a negative effect on the level of fitness of the majority of children and youth, and as a result of that was the spread of deviations of the stature and the decreasing resistance of the body to diseases and the levels of obesity greatly increased with all the diseases accompanied with it which lead to the loss of so many lives.

It is common assumption that physical activity in childhood and adolescence is beneficial to health and that, conversely, physical inactivity in these periods is detrimental to health. Although, there are many health issues that are important to children as overweight, type 2 diabetes, cardiovascular disease risk, skeletal health and mental health. (Smith & Biddle, 2008). (p.31)

Second, in schools the live of individuals changed, instead of student's total freedom of movement, they now have to sit in classrooms for long hours in a specific position causing strain of muscles. Physical inactivity is a key preventable risk factor for cardiovascular and other chronic diseases and mortality, and economically it is estimated that inactivity alone may contribute $5.3 billon to Canadian medical costs (Fortier et al, 2011). Today children receive significantly less time for physical activity during the school day than they did even decade earlier. Although, participation in physical activity is linked to numerous physiological, physiological, and physical health benefits (Fedewa and Ahn, 2011). At the same time physical activity and physical fitness tests didn't get much attention from the teachers of physical education in Libya, it was noted that tests of physical fitness related to health are less heeded

than tests of physical performance and dexterity, which necessitates conducting researches and studies, for this matter which is considered essential for members of the Libyan society, which is the thing that drew the attention of the researcher to investigate the Libyan standards in tests of physical fitness and compare it to the standard of their counterparts in other countries of the word, and that is the problem of the research which takes from in evaluating the elements of physical fitness related to health of students of elementary education in the city of Al-Nikat Alkams.

1.3 Aims of the research

Evaluating the elements of physical fitness related to health of students of elementary education of Libya, and comparing their level with students of other countries according to the availability of data.

1.3 Research hypotheses

1. There are differences of statistical indications between the levels of students of elementary education (city of Al-nikat Al-khams) and their counterparts from the USA in the element of body composition in favor to Libyan students.

2. There are differences of statistical indications between the levels of students of elementary education (city of Al-nikat Al-khams) and their counterparts from the USA in the elements of cardiorespiratory endurance, muscular strength and flexibility in favor to American students.

Chapter 2: Literature review

2.1 Introduction

Physical fitness and physical activity are more important to human's life. Children seem to have boundless energy, it's very important to have a lot of it in different activity. Inactivity cause a lot of diseases, even prevent the risk of diseases should be know what are physical fitness and physical activity.

In this chapter the researcher will illustrate the main idea, some concepts and the details associated to the concepts of this study. He will demonstrate this finding depending on resources and references which is related to contents of the study. This chapter consists of series of terms and their definitions and concepts which are a little story about physical fitness, physical activity and their definition. Also, the benefits of physical fitness and their components. In edition, health related to fitness and physical fitness tests and their benefits.

To stay healthy, students should participate in school especially physical education class. There are reasons why physical education is important in school, which are preventive measure against disease, program for muscle strength and fitness, promotes academic learning, builds self esteem, develops cooperation, teamwork and sportsmanship skill and promotes a physically active lifestyle. According to Trudeau and Shephard (2008) noticed from the US National Longitudinal Study of Adolescent Health, they observed that adolescents who were active in school were more likely to have high grades.

2.2 Fitness

According to Howley and Franks study (1986) fitness is the capacity to achieve the optimal quality of life. This dynamic multidimensional state has a positive health-base and includes individual performance goals. Also, Saleh et al, (2007) identified fitness as the ability of the circulatory and respiratory systems to restore its natural state after performing a particular work.

It is not about being thin, having a small waist, or having bulging muscles. It is a combination of qualities that enable us to be at our full potential in performing vigorous physical activities. (ABC of fitness, 2008)

Atomi et al study (2009) confirmed that fitness seeks to achieve the elements of physical fitness related performance sport, and physical fitness related to health.

2.3 Physical fitness

Jackson et al (2004) study found that fitness is another hard to define term. Its general description for health: if you are fit you will be able to perform your daily activities with energy, and you are less likely to develop chronic disease. Fitness can be also understood as having tow aspects: health related fitness and skill related fitness. Health related fitness is focused on areas that affect our overall health and energy and our ability to perform daily task and activities. Its components include cardiorespiratory fitness, body composition, muscular strength, muscular endurance and flexibility. On the other hand, skill related fitness refer to our ability to perform specific skills need activities and sports. Its components include agility, balance, coordination, speed, power. (p. 8)

Giannuzzi et al study (2003) showed that physical fitness is the ability to carry out daily tasks with vigour and alertness and without undue fatigue and with ample energy to enjoy leisure-time pursuits and to meet unforeseen emergencies. (p. 320)

As we enter the 21st century, one of the greatest achievements to be celebrated is the continuous seek of fitness since the appearance of man. Throughout prehistoric time, man's request for fitness has been driven by a desire to survive through hunting and gathering. Today, and is no longer driven by subsistence requirements, fitness still affect to health and well-being. This article will highlight historical events and influential individuals who have founded the history of fitness beginning with primitive man up to the foundation of the modern fitness movement. (Dalleck & Kravitz, 2009)..

At the same time, Heyward (2006) has found physical fitness is important that you carefully screen your clients for exercise testing, classify their disease risk, identify the disadvantage to exercise testing, and obtain their agreement before conducting any physical fitness tests. You can use laboratory to develop physical fitness profiles. Results from these tests make you to identify strengths and weakness and achieve your objectives. Data from specific tests will help you make accurate prescriptions. Also, you can use baseline and follow-up data to evaluate the progress of exercise program participants. (p. 36)

Orjan Ekblom (2005) study showed that physical fitness as exposure parameters is rather common in studies of human health. Partly it is used as an objective measurement of bodily function, and partly it is used as a substitute evaluation for physical activity. The precision of the assessment of physical fitness is higher, compared to that physical activity. Misclassifications

will lead to a dilution of the effect and hence a lowered contrast between strata. Therefore, measuring fitness has some advantages over less precise measurements of physical activity. (p.11)

Factors that influence physical fitness:

In 2007 Corbin and Lindsey referred to the amount of medicine prescribed for an illness is often referred to as dose. The amount of activity you need to get health benefits is sometimes referred to as an exercise prescription and is measured in doses. To a certain point, people who do more doses get more benefits, but too many doses can be harmful. Following the FIT formula for each type of physical activity can help you get just the right number of doses to achieve good health and fitness.

- Physical activity.
- Nutrition.
- Age.
- Maturation.
- Heredity.
- Other lifestyles.
- Environment.

2.4 Physical activity

At the beginning, many ancient cultures, scientists, and physicians recognized the role of physical activity in promoting the health of mind and body. In china and India, concepts of health and prevention were developing as early as 3000B.C. A medical document written in India between 1000B.C, and 800B.C, the Ayur Vedo, recommended massage and exercise in the treatment rheumatism. Among western cultures, the ancient Greeks studied and understood the effects of physical activity on health, quality of live, and life span. As early as the 5th century, Greek physicians promoted the “lows of health”- breathe fresh air, eat good foods, participate in exercise, and get enough sleep. (Bouchard et al, 2007) (p.22)

Caspersen et al (1985) study showed that physical activity is defined as any bodily movement produced by skeletal muscles that result in energy expenditure. Also, Shekhly et al (2010) said that engaging in activity and sport during leisure time should be basic and interesting through promotion of physical performance.

Dugdill et al (2009) study showed that is for young people physical activity behavior is not a single, simple behavior. Marttila et al (1998) study identified five different categories of physical activity-occupational activities, lifestyle and commuting activities, fitness activities to maintain health, sports activities undertaken as a part of, or in preparation for, competition, physical education and play.

The recent development for physical activity promotion is that fitness (aka, exercise capacity) is now firmly back on the public health agenda. Recent US studies show how, even in the presence of hypertension (and high body mass index (BMI) high cholesterol and diabetes), risks for death are reduced I a graded response to increased fitness in both men and women. (p.157, 220)

In 2006, Maud & Foster's study showed that Physical activity is most often defined in the context of energy consumption as any bodily movement produced by skeletal muscles that substantially increase energy expenditure over the resting level. Volume of physical activity can be calculated from the frequency, duration (time), intensity and type of physical activity.

Although physical activity is often evaluated in terms of energy expenditure, it can be seen as bicultural behavior energy is expended in active behaviors that occur in different forms and cultural contexts. (Hannu & Mechelen, 2003). Physical activity is a modifiable behavior that can help decrease the rate of morbidity and mortality from chronic diseases and it has been shown to decrease all cause mortality. Diseases and/or conditions that have been shown to be increased by lack of physical activity are cardiovascular disease (coronary artery disease), diabetes mellitus types 2, obesity, osteoporosis, osteoarthritis, cancer of the colon and breast and depression. (John, Alen, S., Santos, Delos, 2009). (p. 1)

2.4.1 The impact of schools on physical activity

Today, obesity is one of the most pressing health concerns for our children. More than one-third of children and teens, approximately 25 million kids, are overweight or obese and physical inactivity is a leading contributor to the epidemic. The Surgeon General recommends children should engage in 60 minutes of moderate activity most days of the week, yet estimates show that only 3.8 percent of elementary schools provide daily physical education (PE). (Trost, 2007)

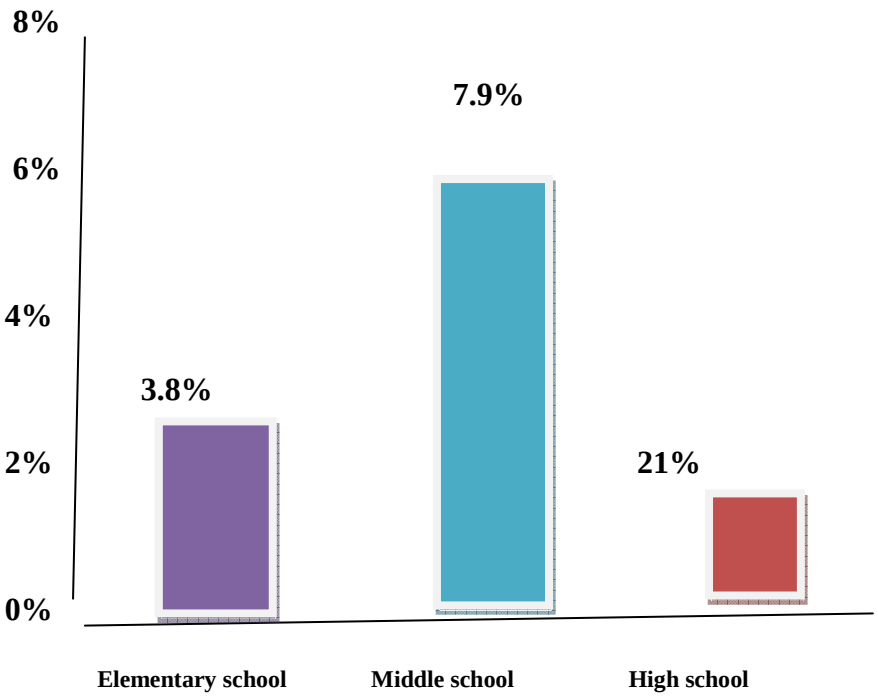

Figure 1: Elementary, middle and high schools. Refer to the percentage of schools providing daily PE in 2006. (From Trost, 2007)

2.5 Defining of physical activity and physical fitness

According to Bouchard et al, 2007 study physical activity defined as include any body movement produced by the skeletal muscles that results in a essential increase over resting energy expenditure. According to this concept, we need to consider leisure-time, physical activity, exercise, sport, transportation, occupational work, and household chores. The energy expenditure associated with physical activity is the only discretionary component of total daily energy expenditure. Energy expenditure of activity is typically only about 25% of daily energy expenditure in a sedentary person, whereas it may be as high as 50% in an endurance athlete on a training day or in persons performing heavy labor for many hours during the day.

Also, physical fitness defined by World Health Organization as “the ability to perform and muscular work satisfactorily”. Fitness implies that the individual has attained those characteristics that permit an acceptable performance of a giving physical task in a specified physical, social, and psychological environment. (p. 12, 13)

Bates, 2006 defined a number of terms related to physical activity and research design. The following definitions help to clarify the meaning of these terms.

Physical Activity / Movement of the body that expends energy, such as participation in physical education (including all dimensions of the program), community events and leisure activities.

Physical Education / The Alberta Kindergarten to Grade 12 physical education program is a core subject with the aim to enable individuals to develop the knowledge, skills and attitudes necessary to lead an active, healthy lifestyle. As such, physical education programs are an integral component of the total school experience for students.

Daily Physical Activity (DPA) / In Alberta, daily physical activity involves all students in grades 1 to 9 being physically active for a minimum of 30 minutes daily through activities that are organized by the school.

Exercise / A subset of physical activity defined as "planned, structured, and repetitive bodily movement done to improve or maintain one or more components of physical fitness.

Physical Fitness / A set of attributes that people have or achieve that relates to the ability to perform physical activity.

Health-related physical fitness components / Aerobic fitness, muscular strength, body composition Performance-related physical fitness components, muscular power, speed, agility, balance, reaction time.

2.6 Benefits of daily physical activity

It is widely acknowledged that physical activity is essential to children's growth and development. Regular physical activity can have a positive impact on students' physical, mental, and social well-being. In particular, physical activity is likely to have an impact on students' achievement, readiness to learn, behaviour, and self-esteem. Positive experiences with physical activity at a young age also help lay the foundation for healthy, productive lives. Research also indicates that children are in danger of developing serious diseases associated with obesity, which can result from a lack of physical activity. The following are examples taken from the research on this subject:

- Studies demonstrate the positive effects daily physical activity has on student performance and academic achievement in terms of memory, observation, problem-solving and decision-making, as well as significant improvements in attitudes, discipline, behaviors and creativity.
- Between 1981 and 1996, the number of obese children in Canada between the ages of seven and 13 tripled. This is contributing to a dramatic rise in illnesses such as type 2 diabetes, heart disease, stroke, hypertension and some cancers; many young people do not have the opportunity to be physically active every day.
- School-based healthy eating and physical activity programs provide a great opportunity to enhance the future health and well-being of children because they can reach almost all children

and may (1) enhance learning and provide social benefits, (2) enhance health during critical periods of growth and maturation, (3) lower the risk for chronic diseases in adulthood, and (4) help to establish.

Healthy behaviors at an early age that will lead to lifelong healthy habits.

- Analysis of data from the CCHS (Canadian Community Health Survey), the CFLRI (Canadian Fitness and Lifestyle Research Institute's) Physical Activity Monitor, and the HBSC (Health Behavior in School-Aged Children) survey indicates that less than half of Canadian children and youth are physically active on a daily basis to a degree of energy expenditure that meets the guidelines for healthy growth and development.
- Studies generally support the suggestion from cross-sectional data that academic performance is maintained or even enhanced by an increase in a student's level of habitual physical activity, despite a reduction in curricular or free time for the study of academic material. (Ophea, 2005). (p. 5)

According to Edowards & Tsouros study (2006) showed that creating and maintaining an active city can help reverse human suffering and the high economic costs of inactivity in terms of health and social services. A United States study (21) found that physically active people have lower annual direct medical costs than inactive people and showed that increasing regular moderate physical activity among inactive adults might reduce the annual national direct medical costs by many billions of dollars. Employers also benefit, since having a physically active workforce can lead to reductions in absenteeism and increased productivity. According to Fortier et al (2011) The College of family Physicians of Canada recommends that physicians routinely counsel their patients on physical activity.

2.7 Physical activity recommendations

According to NIDDK (2010) showed that regular physical activity may help you reach and maintain a healthy weight. Being physically active may also make you more energetic, improve your mood, and reduce the risk of developing some chronic diseases. (p. 1)

In (2009) Marcus & Forsyth study showed that the data from various studies have allowed researchers to develop guidelines for the amount of exercise needed to create and maintain the health benefits. It is currently recommended that people accumulate 30 minutes or more of at least moderate intensity (60 to 74% of their maximum heart rate) physical activity on at least 5(preferably all) days of the week, or at least 20 minutes of at least vigorous intensity (75 to 85% of maximum heart rate) physical activity on 3 or more days per week. (p.4,5)

Table 1: Exercise recommendation for improved overall health (according to Hoffman study 2009)

Intensity	*Duration*	*Frequency*	*Examples*
Moderate (60-74% of maximum heart rate)	*30 minutes or more in one long bout or several 10 minutes bouts*	*5 or more days of the week*	. *Brisk walk for 30 minutes.* . *10 minutes of walking, 10 minutes of raking, 10 minutes of playing tags with kids*
Vigorous (75-85% of maximum heart rate)	*20 minutes or more*	*3 or more days of the week*	. *jogging for 20 minutes* . *spinning class*

According to Hoffman study (2009) showed that the strenuous exercise programs are not required to gain health benefits from physical activity. On the contrary, scientific evidence suggests that engaging in moderate intensity physical activities on a regular basis confers benefits. (p.313)

2.8 Benefits of physical fitness

Tyburczy (2010) study refer to the benefit of fitness, the first benefit is to get the children thinking and to see how well the children can produce information without any real instruction. It's good to see the exploration skills that the children have. Usually in physical education, the task is set right out for you, but in this assignment, the students really have to use mind to find information and present it. The second benefit is for the students to really learn how important it is to be healthy and live a healthy life style. They find out for themselves firsthand how to become a healthy individual and maybe their families also, and showing them how to avoid the effects of being overweight even they can live longer and healthier lives. The third benefit is to get the students to find activities that they can have fun doing and are healthy for them for their lifetime. This is important because you can't really play soccer you whole life, but tennis and running you can do for a long time. It is important to get the kids into these kinds of activities. The students will also have to plan a diet and workout regimen so this will get them to understand how to change their bad habits and get healthy.

2.9 Component of physical fitness

According to Brinmac sport coach (2010) health is a state of complete mental, physical and social well being where as fitness is the ability to meet the demands of a physical task. Basic fitness can be classified in four main components: strength, speed, stamina and flexibility. However, exercise scientists have identified nine components that comprise the definition of fitness:

2.9.1 **Strength** is the extent to which muscles can exert force by contracting against resistance (e.g. holding or restraining an object or person)

2.9.2 **Power** is the ability to exert maximum muscular contraction instantly in an explosive burst of movements. The two components of power are strength and speed. (e.g. jumping or a sprint start)

2.9.3 **Agility** is the ability to perform a series of explosive power movements in rapid succession in opposing directions (e.g. Zigzag running or cutting movements)

2.9.4 **Balance** is the ability to control the body's position, either stationary (e.g. a handstand) or while moving (e.g. a gymnastics stunt)

2.9.5 **Flexibility** is the ability to achieve an extended range of motion without being impeded by excess tissue, i.e. fat or muscle (e.g. executing a leg split)

2.9.6 **Muscle endurance** is a single muscle's ability to perform sustained work (e.g. rowing or cycling)

2.9.7 **Cardiovascular endurance** is the heart's ability to deliver blood to working muscles and their ability to use it (e.g. running long distances)

2.9.8 **Strength endurance** is a muscle's ability to perform a maximum contraction time after time (e.g. continuous explosive rebounding through an entire basketball game)

2.9.9 **Co-ordination** is the ability to integrate the above listed components so that effective movements are achieved.

In 1997 Bouchard et al study showed that health related fitness refers to those components of fitness that related to the health status of the individual and that may be influenced by regular physical activity. It is defined as the state of physical and physiological characteristics that define risk levels for the premature development of several diseases or conditions are related to

sedentary lifestyle. Classify components of health related fitness is summarized in table 2. (p. 91)

Muscular component	*Power* *Strength* *Endurance*
Motor component	*Agility* *Balance* *Coordination* *Speed*
Cardiorespiratory component	*Submaximal exercise capacity* *Maximal aerobic power* *Heart functions* *Lung function* *Blood pressure*
Metabolic component	*Glucose tolerance* *Insulin sensitivity* *Blood lipids and lipoproteins* *Substrate oxidation characteristics*
Morphological	*Body mass for height* *Body composition* *Subcutaneous fat distribution* *Abdominal visceral fat* *Bone density* *Flexibility*

Table 2: The components and factors of health related fitness (from Bouchard et al, 1997)

2.10 Health

Defined by WHO 1998 as a state of complete physical, social and mental well-being, and not merely the absence of disease or infirmity. Health is a resource for everyday life, not the object of living. It is a positive concept emphasizing social and personal resources as well as physical capabilities. (p. 1)

In 1999 Winnick & Short study showed that health is a major challenge, despite progress made in treating diseases and increasing the average life span in Western societies. health can be defined as a human condition with physical, psychological dimensions, each characterized on continuum with positive and negative poles. Positive health is associated with a capacity to enjoy life and to withstand challenges; it is not merely the absence of disease. Negative health is associated with morbidity, and in the extreme, with premature mortality. (p. 9, 11)

In 2008 PCPFS showed that the health is a state of being associated with freedom from disease and illness that also includes a positive component (wellness) that is associated with a quality of life and positive well-being.

2.10.1 Healthy population

Healthy People is the prevention agenda for the Nation. It is a statement of national opportunities, a tool that identifies the most significant preventable threats to health and focuses public and private sector efforts to address those threats. Healthy People offer a simple but powerful idea: provide the information and knowledge about how to improve health in a format that enables diverse groups to combine their efforts and work as a team. It is a road map to better health for all that can be used by many different people, states and communities, businesses, professional organizations, groups whose concern is a particular threat to health, or a particular population group. Healthy People is based on scientific knowledge and is used for decision making and for action. (Healthy people 2000). Also the researchers found that healthier people are more productive at work, earn more, and spend more time in the labour force. (MNT, 2006)

Abuamai et al (2005) illustrate that healthy people are people who engage in different physical activities and exercise program. People who participate in physical activity healthier, able to achieve their work, reduce the risk of diseases and increase the level of production.

Flexibility

Strength

Endurance

Development of an exercise program should consider the elements of flexibility, strength, and endurance.

Flexibility: A general stretching program in clues stretches for the major muscle groups of the upper and lower body. Stretches should be passive as much as possible and should be maintained statically for 20 to 30 s at a time. Active stretches whereby the muscles are loaded and unloaded quickly should be avoided.

Strength: Strengthening exercises can be categorized as general or specific. General strengthening exercises are those that emphasize large muscle groups in gross movements.

Endurance: Endurance is that quality that allows one to exercise for longer periods of time with a minimal amount of fatigue. We can speak of muscular endurance or cardiovascular endurance. Muscular endurance defines the ability of a perform work over time. Muscle endurance can be developed using muscle-specific resistance exercises with low distance but high repetition. For example, programs using weights that can be lifted 12 to 15 times develop muscle endurance, whereas programs using high distance and low repetition are prescribed for strength conditioning. Muscle endurance can be developed using task-specific exercises, or repetition of a specific work task, over a period similar to that in the work environment. In this way you can prepare a patient for return to work.

*Cardio respiratory endurance: U*nderstand how oxygen consumption may or may no be different between individuals with disabilities and individuals without disabilities, and control of circulation at rest and during exercise and understand that individuals with disabilities are often at a higher risk for cardiovascular heart disease. (Cerny & Burton 2001). (p 298, 299)

2.10.2 Health effects

Physical activity has major beneficial effects on most chronic diseases (Table 1). These benefits are not limited to preventing or limiting the progression of disease, but include improving physical fitness, muscular strength and the quality of life. This is particularly important for older people, as regular physical activity can increase the potential for independent living. WHO recently reviewed the evidence for the health effects of physical activity. It is summarized here.

Table 3: Summary of the health effects associated with physical activity (According to Cavill et, al, 2006)

Condition	***effect***
Heart disease	*Reduced risk*
Stroke	*Reduced risk*
Overweight and obesity	*Reduced risk*
Type 2 diabetes	*Reduced risk*
Colon cancer	*Reduced risk*
Breast cancer	*Reduced risk*
Musculoskeletal health	*Improvement*
Falls in older people	*Reduced risk*
Psychological well-being	*Improvement*
Depression	*Reduced risk*

CVD

The strongest evidence indicates that the greatest benefit of physical activity is in the reduction of CVD risk. Inactive people have up to twice the risk of heart disease of active people. Physical activity also helps to prevent stroke and improves many of the risk factors for CVD, including high blood pressure and high cholesterol Overweight and obesity Low levels of physical activity are a significant factor in the dramatic increase in obesity prevalence in the European Region. Obesity occurs when energy intake (dietary intake) exceeds total energy expenditure, including the contribution of physical activity. Body weight normally increases with age, but habitual, lifetime physical activity can reduce weight gain. Participation in appropriate amounts of activity can support healthy weight maintenance or even weight loss. It is also extremely important for people who are already overweight or obese.

Diabetes

Diabetes is an increasing concern in the Region, as rates of type 2 (non-insulin-dependent) diabetes increases. Type 2 diabetes typically occurs in adults aged over 40, although cases are emerging among children and young people as obesity rates rise. Strong evidence indicates that

physical activity helps to prevent type 2 diabetes (18); the risk for active people is about 30% lower than that for inactive people. Both moderate and vigorous-intensity physical activities reduce the risk, but must be taken regularly.

Cancer

Physical activity is associated with a reduction in the overall risk of cancer. Numerous studies have shown the protective effect of physical activity on the risk of colon cancer, the risk for active people is around 40% lower. Physical activity is also associated with a reduced risk of breast cancer among postmenopausal women, and some evidence shows that vigorous activity may provide a protective effect against prostate cancer in men.

Musculoskeletal health

Participation in physical activity throughout life can increase and maintain musculoskeletal health, or reduce the decline that usually occurs with age in sedentary people. Participation by older adults can help maintain strength and flexibility, helping older people to continue to perform daily activities. Regular activity can also reduce older adults' risk of falls and hip fractures.

Participation in weight-bearing activities (such as jumping or skipping) helps to increase bone density and prevent osteoporosis. This is particularly important for the development of bone density in adolescents and for middle-aged women.

Psychological well-being

Physical activity can reduce symptoms of depression and, possibly, stress and anxiety. It may also confer other psychological and social benefits that affect health. For example, it can help build social skills in children, positive self-image among women and self-esteem in children and adults, and improve the quality of life. These benefits probably result from a combination of participation itself and the social and cultural benefits of physical activity. (Cavill et, al, 2006)

2.10.3 Health related physical fitness

First of all, in 1993 according to Bouchard study there is no universally agreed upon definition of fitness and of its components. In the present context, we are particularly interested in what is no referred to as health-related fitness, in the physical and physiological components of fitness that impact more directly on health status. Health-related fitness refers to the state of physical and physiological characteristics that define the risk levels for the premature development of diseases or morbid conditions presenting a relationship with a sedentary mode of life. Important determinants of health-related fitness include such factors as body mass for height, body

composition, subcutaneous fat distribution, abdominal visceral fat, bone density, strength and endurance of the abdominal and dorso-lumbar musculature, heart and lung functions, blood pressure, maximal aerobic power. A favorable profile for these various factors presents a clear advantage in terms of health outcomes as assessed by morbidity and mortality statistics. The components of health-related fitness are numerous and are determined by several variables, including the individual's pattern and level of habitual activity, diet and heredity. Health-related fitness education is an important component of a physical education program. A well-designed fitness assessment process provides students, teachers, and parents with the necessary information to design an individualized program of fitness for each student.

Health-related fitness (HRF) refers to the components of physical fitness that are directly related to the health of an individual and typically includes cardiorespiratory fitness, musculoskeletal fitness (strength, endurance, flexibility, and balance), and body composition. (Courneya & Friedenreich, 2011).

In 2005, Marrow et al study showed that ACSM has identified five fitness factors that are health related, these are cardiovascular endurance, body composition. Muscular strength, muscular endurance, and flexibility. The evidence to support these factors are related to health has come from the branch of medicine called epidemiology, which examines the incidence, prevalence, and distribution of disease. For example, a large majority of epidemiologic studies have indicated that physically active groups have lower relative risk of developing fatal cardiovascular disease (CVD) than sedentary groups. Physically active groups, logically, should have higher levels of cardiovascular endurance, which is the body's ability to extract and use oxygen in a manner that permits continuous exercise, physical work, or physical activities. (p.225)

Finally, one of the national health objectives for the year 2010 is to increase to 30 percent the proportion of people aged 18 years and older who regularly (preferably daily) engage in moderate physical activity at least 30m per day. (Heyward, 2006). (p. 36)

2.10.4 Physical activity is important for health

In 2002, two thirds of the adult population (aged 15 years and over) in the European Union (EU) did not reach recommended levels of activity. Across the WHO European Region as a whole, one in five people take little or no physical activity, with higher levels of inactivity in the eastern part of the Region. Physical inactivity is estimated to cause 600 000 deaths per year in the Region (5– 10% of total mortality, depending on countries) and leads to a loss of 5.3 million

years of healthy life due to premature mortality and disability per year. Physical activity is a critical public health issue because, adequate physical activity is important for many aspects of health, and few people participate in regular health-enhancing physical activity. (Cavill, et al 2002). (p, 5)

2.11 Components of health related physical fitness

There are 5 components of physical fitness, and these components represent how fit and healthy the body is as a whole. Some people think that being physically fit means being in good general health. Other people think that it means being able to lift a certain amount of weight or being able to run a particular distance in a certain time.

There's actually no single agreed upon definition of physical fitness. One common definition is that physical fitness is a set of attributes that people have or achieve relating to their ability to perform physical activity. Another common definition is that physical fitness is a state of well-being with a low risk of premature health problems and energy to participate in a variety of physical activities.

According to Wikipedia, physical fitness is considered a measure of the body's ability to function efficiently and effectively in work and leisure activities, to be healthy, to resist hypokinetic diseases, and to meet emergency situations.

Even though the definition of physical fitness can vary, there's near unanimous agreement on the 5 components of physical fitness. Here's an overview of each of the components. (Functional fitness facts, 2007)

According to Almaiuof study (2004) showed that the ACSM has identified five fitness factors as being health-related; these are indicated in table (4)

Table 4: Health –relegated fitness factors and benefits (from Almaiuof study, 2004)

Cardiovascular endurance
Reduction in risk of cardiovascular disease
Body composition
Reduction in risk of cardiovascular disease
Reduction in risk of adult –onset diabetes
Reduction in risk of cancer
Muscular strength
Reduction in risk of low back pain
Improved functional capacity
Improved posture
Ability to conduct daily activities
Muscular endurance
(Same as muscular strength)
Flexibility
(Same as muscular strength)

Evidence to support these factors as being related to health has come from the branch of medicine called epidemiology, which examines the incidence, frequency, and distribution of disease. For example, a large majority of epidemiologic studies have indicated that physically active groups have lower relative risks of developing fatal cardiovascular disease (CVD) than sedentary groups (Caspersen1989). Physically active groups, logically, should have shown an inverse relationship between death rates and cardiovascular endurance.

The poorest cardiovascular endurance quartile death rate was 8.5 times higher than the fit quartile. People who suffer from obesity have higher rates of CVD, cancer, and diabetes. Thus, body composition is included in a health –related fitness battier to determine percent body fat and the presence of obesity (ACSM 1991). The factors of muscular strength, muscular endurance, and flexibility do not have the same level of research evidence to support their relationship to good health. However, a minimum level of muscular fitness is essential for accomplishing daily activities and conforming expected or unexpected physical challenges. Health-related physical fitness involves such characteristics as cardiovascular endurance, muscular strength and endurance, and flexibility. Helping children develop and retain these characteristics is an important function of the physical education program.

2.11.1 Cardiorespiratory endurance

Cardiorespiratory fitness is a measure of how well your body is able to transport oxygen to your muscles during prolonged exercise, and also of how well your muscles are able to absorb and use the oxygen, once it has been delivered, to generate adenosine triphosphate (ATP) energy via cellular respiration (cellular respiration is a chemical process in your body's cells that converts the energy stored in the food you eat into the ATP form of energy that is recruited for use by your muscles). Essentially, your cardiorespiratory fitness level is a measure of the strength of your aerobic energy system. (Shapesenese.com, 2011) (p, 2)

Concerning the importance of the cardio-respiratory endurance as an essential one of the physical fitness elements related to health, the agreement completed in Paris conference was considers as unanimous resolution by European Sports committee, after that they discussed the results of this conference in the sixth conference for the European physical fitness in Turkey in 1995 and the coordination committee was made of representatives from ten countries representing cares and participations of 38 European states, consequently , the paper dealing with the fitness related to health was published in 1995 to limit the dimensions in:

- Aerobic fitness
- The Muscular skeleton fitness
- The Motor fitness
- The Body Structure

Thus it seems clear that the importance of what is currently known as aerobic fitness depends basically upon the safety of both cardio-respiratory systems. The most commonly accepted components of health fitness include cardiovascular endurance, muscular strength and endurance, flexibility and body composition. (Almaiuof, 2004)

Greenberg et al 2004 showed that engaging in physical activity, even breathing, requires oxygen. Without oxygen, you would not be able to burn the food you need for energy. To supply oxygen to the various parts of the body, you must have a transport system. The body’s transport system consists of lungs, heart, and blood vessels. When you breath, you inhale air that contains oxygen into the lungs. The lungs absorb oxygen into their blood vessels and transport it to the

heart, where it is pumped out through other blood vessels to all parts of the body. The more efficiently and effectively you transport oxygen, the greater your cardiorespiratory endurance (cardio for heart and respiratory for lungs and breathing) the ability to supply and use oxygen, over a period of time and in sufficient amounts, to perform normal and unusual activities.

Interpreting for cardio and respiratory

In 2010 ShoopingTrolley.Net, showed that The cardio-respiratory system consists of the cardio vascular system (heart and blood vessels) together with respiratory system (lungs and air ways). These systems work to transport oxygen to the muscles and organs of the body and remove waste products including carbon dioxide.

Cardiorespiratory system

- The heart
  - Right side pumps blood in the pulmonary circulation.
  - Left side pumps blood in the systemic circulation.
- Blood pressure
  - Systole, contraction.
  - Diastole—relaxation.

The Heart

According to ShoopingTrolley.Net (2010) the heart is a double pump. "Oxygen-poor" blood enters the heart from the vena cava to the right atrium, and flows down to the right ventricle. The first pump pumps "oxygen poor" blood to the lungs from the right ventricle of the heart via the pulmonary artery where it returns as "oxygen rich blood" via the pulmonary vein to the left atrium. It flows through to the left ventricle, where the second pump of the heart pumps the oxygen-rich blood to all the other parts of the body, via the aorta. Here are four valves that ensure blood flows in the correct direction, these are the pulmonary valve, the tricuspid valve, the mitral valve and the aortic valve.

The number of times the heart beats per minute, otherwise known as the pulse rate, is affected by the age and fitness of a person and their current level of activity. The heart's muscle wall is called the myocardium. Oxygen for the heart muscle itself is provided by blood vessels wrapped around the surface of the heart, not the blood flowing through it.

The Lungs

The total lung capacity is approximately 5 liters - this is the maximum amount of air the lungs can contain.

The tidal volume is the volume of air breathed in and exhaled during normal breathing and is approximately 500 ml.

Residual volume is the volume of the air remaining in the lungs after the maximum amount has been exhaled. It is around 1.5l.

The vital capacity is the maximum amount of air that can be exhaled after a maximal intake of breath.

Residual volume is the volume of the air remaining in the lungs after the maximum amount has been exhaled. It is around 1.5l. The vital capacity is the maximum amount of air that can be exhaled after a maximal intake of breath.

Benefits of cardiorespiratory endurance exercises

Cardiorespiratory endurance exercise helps the body become more efficient and better able to cope with physical challenges. It also lowers risk for many chronic diseases. The cardiorespiratory system consists of the heart, the blood vessels, and the respiratory system. The cardiorespiratory system transports oxygen, nutrients, and other key substances to the organs and tissues that need them; it also carries waste products to where they can be used or expelled. (Jerry et al, 1988)

Do you want to be able to cope with physical challenges easier?

Do you want to lower risks for chronic diseases?

Do you want to prevent cardiovascular disease?

Do you want to strengthen your heart and have more energy for your everyday life?

Then improving your cardiorespiratory endurance is the answer for you.

- Improved cardiorespiratory function.
- Improved cellular metabolism.
- Better control of body fat.
- Improved immune function.
- Improved psychological and emotional well-being.

- Reduced risk of chronic disease
  - Cardiovascular disease.
  - Cancer.
  - Type 2 diabetes.
  - Osteoporosis.
  - Deaths from all causes. (Fahey et, al, 2010)

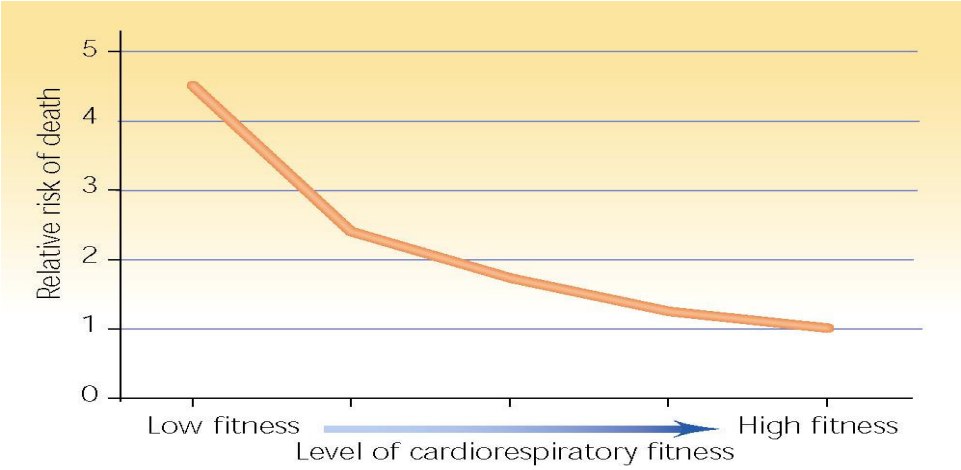

Figure (2) Cardiorespiratory fitness level (Fahey et, al 2010) refer to the cardiorespiratory fitness and risk of premature death. People with high levels of cardiorespiratory fitness have a substantially lower risk of premature death than unfit individuals.

2.11.2 Muscular strength

It is the amount of force that your muscles can exert against resistance. When you use your muscles regularly, they become strong. They help you life, push, pull, jump, twist, turn, and bend. Having muscular strength can keep you from being easily fatigued. It can keep your muscles from become sore or injured when you do things like shovel snow or mow the lawn. Strong muscles also help you stand, sit and walk easily. When you have strong abdominal and back muscles, you are less likely to have lower back pain. You are more likely to have correct posture.

Upper body strength and endurance are important for performing many daily tasks requiring lifting, carrying, pulling, or pushing objects. Prevention of injuries may be improved through increases in muscular strength. (Lamb, 1994) (P. 13)

Types of muscular strength

According to Krav Maga for fitness, there are two kinds of muscular strength. The first is dynamic strength, or the force generated by a muscle group as a body part is moved. Squats, leg presses, pushups, and bench presses are all considered dynamic strength exercises since movement is occurring.

The second types of muscular strength are static strength, which is built from the force generated against an immovable object. This is also sometimes referred to as isometric strength. Force is generated so the muscle is working, but no actual movement occurs. An example would be pushing against a car. It will take a certain amount of static strength to get the car moving. Once you get the wheels moving, you may start to move your legs. However, your upper body will remain still though it continues to generate force.

According to Urwin and Sheppard study (2002) the types of muscular strength are:

*Static or isometric***:** Maximum force versus immovable object.

Dynamic or isotonic: This involves repetitive application of force.

Explosive: This involves maximum force used in one movement. (p. 25)

2.11.3 Flexibility

Flexibility is a joint's ability to move freely through a full and normal range of motion. Factors that affect flexibility include: genetic inheritance, the joint structure itself, connective tissue elasticity within muscles, tendons or skin surrounding a joint, strength of opposing muscle groups, body type, age, activity level and gender. Flexibility is an important component of fitness that is often neglected. Flexibility is not something just for dancers, gymnasts, and martial arts athletes to work on. Flexibility is an important part of fitness for everyone regardless of age, gender, goals, or experience. A major cause of lower back pain can be due to poor flexibility of the low back and hamstrings (back of upper leg). It is never too late to start improving overall flexibility. Good flexibility will help alleviate stiffness, prevent injuries, and maintain good range of motion in the joints. (NYC, 2005)

Sharkey and Gaskill study (2006) defined flexibility as the range of motion through which joints are able to move. The natural range of motion of each joint depends on the design of the joint

and the associated tendons, muscles, and ligaments. Furthermore, the flexibility of each joint is influenced by gender, habitual use, and stretching of the joint and associated structures.

Types of stretching

According to (NYC, 2005) Further complicating the already-complex and controversial subject of flexibility is figuring out what exercises are best for you. Several methods of stretching will improve range of motion and enhance muscular performance. Here is a brief description of a few stretching techniques.

Static: Static stretching is often seen in the health clubs or at sporting events when athletes slowly stretch their muscles to the end point of movement and hold the stretch for a period of time, such as doing a split.

Ballistic: Ballistic stretching is a very controversial technique that uses bouncing and abrupt movements to gain momentum to create greater range of motion. Most experts feel that this type of stretch does not allow the muscles and tendons to fully adapt to the demand of the stretch position.

Active: In active stretch, the limbs and joints are stretched to a given point and held in position using an opposing muscle group. For example, to stretch your quadriceps you would bring your heel back to your buttock and hold it there using your hamstrings. This form of stretch is demanding, but effective because there is no external force applying pressure to the skeletal muscle.

Flexibility benefits

- Improve and maintain your range of motion, which improves balance.
- Increased physical efficiency and performance.
- Increased balance and coordination.
- Decreased risk of low back pain.
- Reduce tension and stress.
- Decreased risk of injury.
- Decreases recovery time.
- Improve circulation and concentration.

- Prevent falls.
- Relieve chronic pain.
- Improve your posture. (NYC, 2005)

2.11.4 Body composition

Body composition is particularly body fat percentage can be measured in several ways. The most common method is by using a set of measurement calipers to measure the thickness of subcutaneous fat in multiple places on the body. This includes the abdominal area, the subscapular region, arms, buttocks and thighs. These measurements are then used to estimate total body fat with a margin of error of approximately four percentage points. (Wikipedia, 2011)

Cale & Harris, 2005 refers to the proportion of body weight that is fat in contrast to lean body mass (muscles, organs and bones). A healthy body weight is important for health as it is associated with a reduced risk of obesity which is associated with increased risk of coronary heart disease, stroke and diabetes. (p.82)

Pediatric obesity is a public health concern in Canada, and none of the Canadian provinces or territories are meeting the physical activity guideline of 90 min of daily activity. According to the 2004 Canadian community health survey, there are 26% overweight and 8% obese children between 2 and 17 years of age. These trends are particularly important given that childhood obesity is associated with many acute and chronic health consequences. (Doyle et al, 2011) (p.516)

Why is body composition important?

You could say body composition depends on the other components of physical fitness. Having a poor body composition has many negative physical and psychological effects such as increased chance of a host of chronic diseases and depression. As mentioned previously, improper exercise habits and choices can not only lead to being overweight and obesity, but decreased bone mass associated with osteopenia and osteoporosis. (Ask the Trainer.com, 2011)

In 2012 Hallal et al study showed that is association between physical activity and body composition may be regarded as a tow-way street. On one hand, low levels of physical activity may result in accumulation of fat mass, while in opposite higher levels of physical activity may

increase lean mass. On the other hand, body composition may affect physical activity, for example, higher levels of adiposity may impede exercise directly and indirectly, such as obese children having lower self-esteem, thus being less likely to exercise. (p. 185)

2.12 Obesity: definition, types and causes

Definition

Alexander-Mott, LeeAnn and Lumsden, D. Barry. (1994) study showed that obesity medically defined as a deposition of fat tissues that is sufficiently large to impair health. Culturally defined as a degree of body fat compatible with social standards of physical attractiveness and in certain professions, employment or competition criteria. (p. 221, 222)

Joshi study (2010) referred to obesity and overweight have to be reviewed in terms of the lean body mass or muscle to body fat. An athlete for example will have highly developed muscle mass and therefore may be overweight according to the layman but his body has more muscle than fat in proportion. It is therefore, not a mere matter of total weight, one must be able to distinguish between weight due to well development muscle mass and due to excessive flab or fat deposition.

- **Types of obesity**

1. Developmental obesity: this category of obesity begins in the early years of a child's life and continues steadily over the adult years. Hence, the foundation has already set in by the time the child is about four years old. The cells become saturated with fat and as the child grows older, more and more fat accumulates I the body. Muscle and bone mass also increase since, the body has to carry the additional weight. Such children usually grow tall, look older for their age and are obese right through infancy even up to their adult years. This type of obesity results in a higher lean body mass along with the fat.
2. Reactive obesity: this type develops due the periods of emotional stress in a child's life. During such stress periods the child may overeat resulting in increase of weight. However, since these periods are intermittent, the weight also reflects ups and downs.

- **Causes of obesity**

1. Hereditary factors: although genetically the child is not determined to be obese yet obesity in parents influences obesity in children since the food habits of parents mould those of child.

   Other genetically associated factors are the activities of the child such as fidgeting which is an important way of burning up calories. Some people who squirm and wriggle use up calories whish equal to those burnt on jogging several miles every day.

2. Social and cultural factors: people in upper socioeconomic strata tend to be more obese mainly due to their rich food intake and luxurious life style which involves minimum physical activity.
3. Emotional factors: the correlation between obesity and emotional factors has been well established. Overeating may result from boredom, loneliness or a sense of social rejection. Today, while watching television, one find many teenagers and adults eating crisp, oily snacks with soft drinks as a means of passing time.
4. Abnormalities of glandular functioning or metabolism: a minor group of people suffer from obesity due to malfunctioning of some, one, ore more of the endocrine glands, i.e. thyroid, pituitary or sex glands. (p. 243, 235)

2.13 Defining health related fitness

Physical fitness is defined as a physical state of well-being that allows people to perform daily activities with vigor, reduce their risk of health problems related to lack of exercise, and establish a fitness base for participation in a variety of activities. (Karinharju, 2005)

The Winnick and Short (1999) study defined fitness related health as the components of fitness that are affected by habitual physical activity and related to health status. (p, 11)

The Bouchard et al, 1997 defined physical fitness related health as a state of physical and physiological characteristics that define risk level for the premature development of several diseases or morbid conditions, where these diseases or conditions are related to a sedentary life style. (p, 90)

2.14 Health benefits of activity and fitness

The idea that physical activity is associated with good health is not new. The Chinese have long practiced tai chi and other forms of activity to prevent diseases associated with sedentary living. In Rome more than 1500 years ago, the physician Galen prescribed exercise for health maintenance. References to the health values of exercise appear throughout recorded history, usually with little measurable effect on the populace. Why, then, do we invest time and energy to provide the latest evidence on the relationship between physical activity, physical fitness, and health? One reason is that we are devout optimists, the product of many years of professional experience and numerous heartwarming success stories. Another reason is that never before have so many studies said so many positive things about the health benefits of activity and fitness. Many of us spend half our time wishing for things we could have if we didn't spend half our time wishing. (Brian & Steven, 2007) (p. 14)

It helps people to reduce risk of developing diabetes, developing high blood pressure, and developing colon cancer. Also, reduction of blood pressure in people who already have high blood pressure, and fleeing of depression anxiety. Finally, it helps in controlling body weight, building and maintaining healthy bones, muscles, and joints, and developing strength and agility in older adults so they are able to move about without falling. (Vivian, 2006)**.** (p.3)

2.15 How are physical activity, physical fitness and health related?

Many people assume that physical activity and physical fitness are directly related but they actually represent very different things. Physical activity is a behavior while physical fitness is a trait or characteristic. While physical activity will contribute to physical fitness the relationships are not as strong as many would expect. There are a variety of other factors that influence levels of physical fitness and many are outside of a person's control. The relationship between physical activity and obesity is also not as high as would be expected (especially among children). Even if a relationship is present, it is not clear that it is a "causal" factor. Physical inactivity can lead to obesity but it is equally plausible that obesity leads to inactivity. The current consensus is that physical activity and physical fitness are reciprocally related (bi-directional arrow) and that they exert independent effects on health. This implies that a person needs to be physically active even if they have reasonable levels of fitness. Individuals with low levels of fitness can also obtain health benefits by remaining physically active. Because some of the factors influencing fitness are out of a person's control (e.g. genetics and rate of maturation), emphasis should be placed on

being physically active. The model presented below is useful in understanding the relationships between physical activity, physical fitness and health. (Welk & Meredith, 2008)

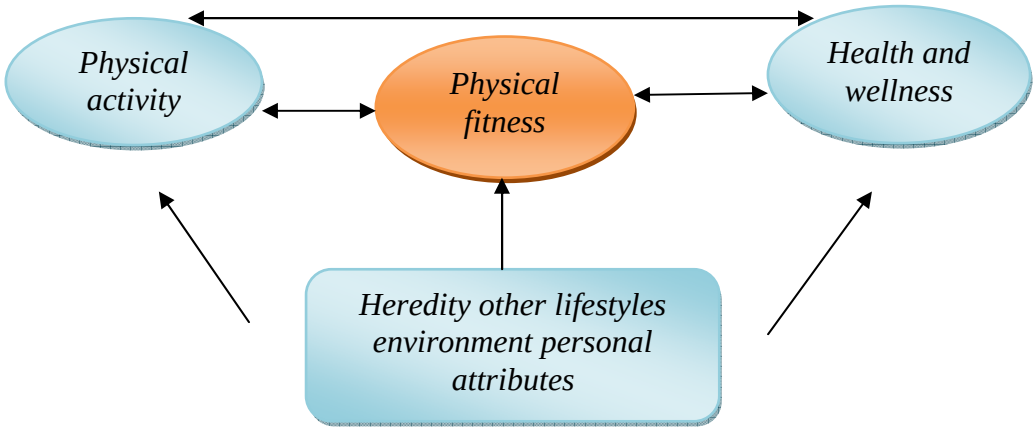

Figure (3) Physical activity, physical fitness, health and wellness. Complex relationships among physical activity, physical fitness, health, wellness and other factors. **(**Welk & Meredith, 2008**)**

2.16 Is physical activity important for the health of children?

Direct links between physical activity and specific health outcomes have been established primarily among adults. Research has been conducted on the health benefits of activity in children but the relationships are harder to detect. There are a number of reasons for this but the primary one is that chronic diseases that plague our society take time to develop. The progressive nature of chronic conditions strongly suggests that the presence of risk factors during childhood increases the likelihood of health problems during adulthood. A number of studies have documented links between physical activity and physical fitness and cardiovascular disease risk factors (mainly cholesterol) in children. The relationships appear to be confounded to some degree by body fatness which indicates that physical activity may not provide complete protection from the health risks of obesity in children, because both physical activity and fatness have been found to track over the lifespan. It is important that children establish positive lifestyle habits and healthy levels of fitness at an early age. A comparison of different lifestyle factors in the Amsterdam Growth and Health study found that physical inactivity was the most important lifestyle parameter related to future CHD risk. While there are significant health benefits associated with physical activity for children the relationships would likely be contingent on continued involvement over time. Therefore, a more important rationale for promoting physical activity is to establish long-term interest in physical activity. Thus, the goal for youth activity promotion should be to help children develop the cognitive and behavioral skills to help them be active through adolescence and into adulthood. Blair and colleagues

presented a conceptual model describing the links and relationships between children's physical activity and health. A modified version of this model is presented below to serve as the basis for the remaining material presented in the chapter.

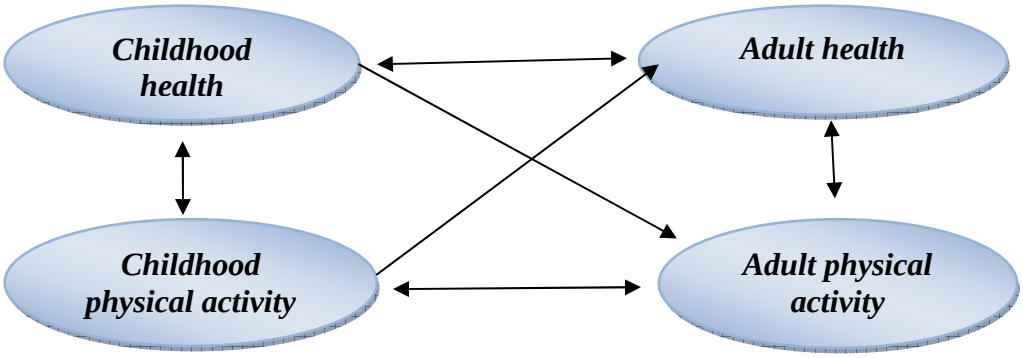

Figure (4) Childhood health and childhood physical activity, adult health and physical activity, shows an important concept in the model is that there are reciprocal relationships (bidirectional arrows) between physical activity and health. (From Welk & Meredith, 2008)

Physical activity is needed for good health, but it is also true that a person must have reasonable levels of health and fitness to be able to participate in physical activity. The same is true regarding body composition as physical inactivity is both a cause and consequence of overweight and obesity. Physical inactivity clearly increases risks for becoming overweight or obese but once a person is overweight physical activity becomes less enjoyable and more strenuous. This is true for both children and adults.

A second important concept is that good health requires that healthy behaviors be maintained over time. An active child will benefit from physical activity during childhood, but these benefits will not be retained unless the child adopts an active lifestyle as an adult. While fitness is important in childhood, the more significant, long-term objective is to promote activity habits so that active children eventually become active adults. (Welk & Meredith, 2008)

2.17 Definition of physical fitness test

According to Answer Corporation, 2010, physical fitness test is a test to see how fit you are. They are often categorized into different fitness capacities such as tests of strength, power, flexibility, agility and endurance plus many more.

2.17.1 Purposes of measurement, testing, and evaluation

Prospective professionals in human performance, physical activity, health promotion, and the fitness industry must understand measurement, testing, and evaluation because they make

evaluative decisions on a daily bases. The students, athletes, clients, and colleagues asking what tools are best and how to interpret data may be the most important concepts that you will study. Related evaluation concepts are objectivity, reliability, relevance, and validity. There are many ways to use the evaluative process in human performance. For instance, consider the issue of accountability. Your employer might hold you accountable for a project. That is you might be responsible for obtaining a particular outcome for as an individual program. Test, measurement, and the evaluation process are used to show whether you are accountable. Obviously, you want the evaluation to accurately reflect the results of your work assuming that you did good job! Certainly, if you enter the teaching profession, you will hold your students accountable for learning, and retaining the content of the courses you teach. Likewise, your students should hold you accountable for preparing the best possible tests for evaluating their class performance. (Almaiuof. 2004)

2.17.2 Purposes of physical fitness testing

The 5 components of physical fitness represent how fit and healthy the body is as a whole. When you have the battery of tests performed you will receive information on the specific areas you made need to work in. A very specific goal oriented fitness program can be developed from the test battery.

First of all, if body composition is of (higher fat compared to muscle mass) there are many health related diseases and illnesses you have a higher chance of contracting. It is important to combine healthy eating habits with your exercise program.

Second, if you scored low on the cardiovascular test you would have a higher chance of being at risk for heart related illnesses and would not do well with activities that require longer times to complete. You would practice in things such as long bike rides, swimming and jogging for prolonged periods of time to improve this component. On the other hand, the next three tests can have results that are isolated to specific joints and muscles of the body or affect the body as a whole.

First, if you score low on the flexibility tests, you have a greater chance of decreased performance in daily living activities/sports and a higher risk of injury. You may also experience low back pain. It would be important to included flexibility training into your workout everyday. Second, if you scored low on the muscular endurance test you fatigue early into the exercise or activities of daily living. Many exercises that require high reps and low weight would be implemented into your training program. Third, if you scored low on the muscle strength test you do not have enough strength to perform well in sports, resistance training and activities of

daily living. Your fitness program would have a progressive strength training component added that would allow you to become stronger with little chance of injury over time. Fitness testing has its limitations while it gives you a good idea of where your body is, it does not paint the entire picture. As stated earlier some of the above tests are only testing specific body parts. Other important factors such as balance and agility are not tested. It also requires the ability to perform the tests. It would be dangerous for someone who is in poor condition and does not exercise to participate in fitness testing.

Finally, before deciding to undergo fitness testing, make sure you know why they are being done and determine that it is safe for you to participate. (Lifetime fitness routines.com, 2006)

In 2006 Heyward study found that you can assess each component of physical fitness and to develop physical fitness profiles for your clients. At the seam time from these tests enable you to identify strengths and weakness and to set realistic and attainable goals for your clients.

Data from specific tests will help you make accurate and precise exercise prescriptions for each client. Also, you can use baseline and fallow-up data to evaluate progress of exercise program participant. (p.36)

2.18 Health related physical fitness testing

In 2004, Stratton et al study showed that are two kind of physical fitness testing, laboratory and field tests. Field tests are particularly suitable for large population groups; they require limited equipment. On the other hand, laboratory tests require specialist equipment used by personal that have experience in measurement systems and are able to interpret scientific test data. (p. 92)

Physical fitness test is a test designed to measure physical strength, agility, and endurance. They are as part of the physical education studies, in medicine as a part of diagnostic testing, and as eligibility requirements in fields that focus on physical ability such as military or police. Throughout the 20th century, scientific evidence emerged demonstrating the usefulness of strength training and aerobic exercise in maintaining overall health, and more agencies began to incorporate standardized fitness testing. In the United States, the President's Council on Youth Fitness was established in 1956 as a way to encourage and monitor fitness in schoolchildren. (Wikipedia)

At the same time, physical fitness is important to reduce the risk of diseases, identify any changing in exercise testing, and obtain their informed consent before conducting any physical fitness tests. You can use laboratory to develop physical fitness profiles. Results from these tests enable you to identify strengths and weakness and to set realistic and attainable goals. Data from

specific tests will help you make accurate and precise exercise prescriptions. Also, you can use baseline and follow-up data to evaluate the progress of exercise program participants. (Heyward, 2006). (p. 36) Lamb study (1994) showed that catalyst in the emphasis on measurement of youth fitness was the 1954 study by Kraus and Hirschland. This study concluded that U.S. youth were less physically fit than their European counterparts. In 195B, the American Alliance for Health, Physical Education and Recreation (AAHPER) developed a youth fitness test. The designers of this test equated youth fitness with speed, power, agility, cardiovascular endurance, and muscular strength/endurance. Motor performance levels were the measure of youth fitness until the late 1970's; physical educators became dissatisfied with the performance emphasis and its promotion of athletic ability.

In 1980, the American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD) published the Health-Related Fitness Manual as a first step to incorporate current research findings in its operational definition of physical fitness. Using these findings, a health-related fitness test was created (see Table 5 and 6). Promotion of the concept of health-related fitness was meant to compliment the motor skill objectives of Physical Education programs. Also in 1980, the U.s. Department of Health and Human Services endorsed the implementation of health-related fitness programs for children. (p. 8, 9, 10)

Comparison of 1950 and 1980 youth fitness

Table 5: 1950 youth fitness (from AAHPERD, 1980)

Test item	Fitness components
Pull-ups/modified pull-ups	Muscular strength
sit-ups	Muscular endurance
Shuttle run	Agility
Standing broad jump	speed
50-yd dash	Power
Softball throw	Speed Skill
600-yd run/walk	Cardiovascular Endurance, speed

AAHPER (1950) youth fitness test

Table 6: 1980 youth fitness (from AAHPERD, 1980)

Test item	Fitness components
Mile run or 9-minute run Sum of triceps and subscapular	cardiovascular fitness
Sum of triceps and subscapular skinfolds	Body composition
sit-ups	Muscular endurance
sit and reach	Flexibility

AAHPERD (1980) youth fitness test

2.18.1 Cardiorespiratory test. (9 mile run)

The one mile run or nine minute run is a valid field test of cardiorespiratory function and a performance because it is related to maximum oxygen intake, along with other physiological parameters of cardiorespiratory function and provides an index of the participant's ability to run distance. (The American Alliance, 1900). They were designed to determine the maximal aerobic power of schoolchildren, healthy adults attending fitness class and athletes performing in sports with frequent stops and starts. (Leger et al, 1988)

2.18.2 Muscular strength and endurance test. (Sit-up test)

Muscular strength and endurance are critical to both your health and ability to carry out daily activities, such as performing household tasks (yard work, carrying groceries) or job related health (lifting or moving heavy objects). There are many ways to measure your muscular strength and endurance, often with a focus on a specific group of muscles. (The president challenge).

One minute sit up test measure muscular strength and endurance of the abdominal muscles, important for maintaining good posture and minimizing lower back problems. (Harr & Hass, 2006)

Howley & Franks, 1997 study showed that abdominal strength plays an important role in the prevention of low-back pain, a modified sit-up test used to evaluate the abdominal strength, a low score on this test may be indicative of a high risk for future low-back problems. (p. 105)

2.18.3 Body composition test. (Skinfold caliper)

Refers to any method which is used to determine the ratio within a person's body of fat, protein, water, and tissues. The primary goal of these tests is to note the amount of fat in the body in

comparison to other forms of matter. High levels of fat put a person at a higher risk for many health problems and a lower quality of life than those who have body fat levels within a healthy range. There are several methods that are currently used to figure out body composition, the most common being the body mass index, waist circumference measurements, and skinfold measurements. (Hill, 2003)

According to Howley & Franks, 1997 appeared that the determination of body composition by measuring the thickness of skinfolds has had the widest use, compared to the other techniques. The basis of measuring body fat in this way is that approximately 50% of the total fat content of the body is located subcutaneously, or just beneath the skin. Measuring the thickness of a skinfold involves grasping a fold of skin and fat away from the underlying muscle. A skinfold caliper is used to measure the skinfold thickness to the nearest ½ mm. (p. 54)

2.18.4 Flexibility test. (Sit and reach)

Because flexibility is joint-specific, determining the ROM of a few joint does not necessarily provide an indicator of flexibility in other joints. Some tests can be used to estimate flexibility of certain body joints; these indicators of joint flexibility range from simple tests to the more complex tests that require specific measuring equipment. A test is commonly used by fitness instructors is the sit-and-reach test. (Howley & Franks, 1997) (p. 106)

The sit and reach test is a common measure of flexibility, and specifically measures the flexibility of the lower back and hamstring muscles. This test is important as because tightness in this area is implicated in lumbar lordosis, forward pelvic tilt and lower back pain. This test was first described by Wells and Dillon (1952) and is now widely used as a general test of flexibility. (Topendsport)

The researcher will demonstrate how the method will follow to collect his data. First, how many schools will be select, what's the number of participants or students, their level class and age. The research will show the tools and the instruments of the study. As well as, he will determine the health related to fitness tests which will use in the study, and the components of health related to physical fitness that will be tested.

2.19 The importance of physical education:

Almaiuof (2004) study showed that teaching process as an activity to have an effect on the personality of pupils, so as to develop their behaviour to achieve comprehensive growth.

Teaching methods are those different activities which are directed by the teacher to achieve the goals or to help pupils to acquire information, skills, habits, attitudes and to encourage them to improve their knowledge and discoveries. Technology has approved the necessity of the learning process by the teacher; where teachers are forced to use new technology to improve teaching styles and to draw strategic plans for lessons. These plans consist of new teaching methods and aid to reach the goals and the teacher is similar to a farmer who takes care of plants, but his job is to help the individual to grow normally. Physical education lessons are the most important part of the school program. Through the lessons teachers can offer different experiences to reach the goal of curriculum. This can be achieved during two units per week. The teacher should take into consideration the general outline of the teaching methods, aids, progressive teaching as well as testing, management and evaluation. Teaching and education departments should give physical education the proper status in the education program, because our future men want to know about the human and body more than other sciences. Sport, either private such as the prayer that the individual performs by himself inside a closed room, or public, which is performed in a field in groups, is like prayer that is performed in groups inside the houses of worship. The first type is for the individual, but the second one is for all people who do not let others perform it for them". Sport is like prayer, food and breathing. It has many health and recreational benefits. The requirements for the socialized society regarding physical education for new generations cannot be established only by practical scientific rehabilitation for new generations cannot be established only by practical scientific rehabilitation for sport trainers in schools but with inclusion of sport science in schools at different levels for both trainers and students. However, the science of sport is a relativity new science. It acquires its importance from the increased importance of physical education. It is a complex science. It takes its material and subject from sciences such as the history of physical education, training, administration and organization, and so on. Pedagogical teaching methods are related to all the mentioned subjects. (p. 38, 39)

2.20 Related studies

Assessment of physical fitness of elementary school children

According to Wight (1985) many young people are not getting enough exercise or teaching in the public school systems. Also, 57 percent of youngsters between ages 6 and 17 unable to meet standards of fitness regarded as attainable by the average healthy child. A few children in 5 grades through 12 attend daily physical education. The purpose of this study was to examine selected fitness test data from 1979-1984 from the Lubbock Independent School District in order to assess current levels of fitness of 4, 5, and 6^{th} graders, examine the 6 year trend for each of the grade levels, and compare local fitness norms to TAHPERD state and AAHPERD national norms, where applicable. The researcher's hypothesis was the 4^{th}, 5^{th}, and 6^{th} graders of the L.I.S.D. will score above the Texas and National norms on the majority of fitness items, and current 1983/1984 elementary school age students will score higher on fitness tests items than those youngsters in 1979/1980.

Moreover, the researcher dealt with research methods and statistics in his paper, with using purposive sample to chose his sample which were 5 elementary schools located in Lubbock, Texas were used as source of data. The researcher selected three tests in his study which were arm hang, sit up, and 1-mile run to evaluate muscular strength and endurance of the arms and shoulders, muscular endurance and strength of abdominal region, and cardiorespiratory endurance. The researcher used computer which used the Texas Tech Network System. School code number, year, grade level, student code number, sex, height, weight, birth date, row score and a percentile for each test were encoded for each student. The researcher analyzed the data by using SPSS program, and the statistical procedures were means which is commonly used method of describing central tendency, standard deviations that is important to use to indicator of dispersion, maximum and minimum raw scores. He analyzed the data by one way analysis of variance (ANOVA) also is allowing the evaluation of the null hypothesis between two or more group means, and polynomial contrast. The ANOVA was performed to test if the means, by year, of the fitness tests were significantly different. The polynomial contrast was performed to determine if linearity existed in the means for all six years of each fitness test, indicating a change of status in fitness. The researcher used analysis of variance (ANOVA) because his sample was more than two groups which is 5 elementary school.

Comparing health related physical fitness and activity between old order Mennonite children in Ontario and rural children in Saskatchewan

David study (2003) showed that temporal trend research in some components of health-related physical fitness and activity among young people are lacking. However, the increasing prevalence of overweight and obesity in young people over the last couple decades has created speculation of secular deterioration in health-related physical fitness and activity. In an effort to address the speculation, this research project compared health-related physical fitness and activity between two groups of children: Old order Mennonite children in southwestern Ontario, who live an agrarian lifestyle which does not include motorized transportation, computer use, or television viewing and rural children in central Saskatchewan, who live a contemporary Canadian lifestyle. The Canadian Physical Activity, Fitness, and Lifestyle Appraisal (CPAFLA) was used to measure health-related physical fitness. The CPAFLA is a battery of tests measuring anthropometry (standing height, body mass, skinfolds, and waist girth), cardiorespiratory endurance (step test), and musculoskeletal fitness (handgrip strength, push-ups, partial curl-ups, and trunk forward flexion). The aim of this research project was to compare health-related physical fitness and activity between Old Order Mennonite children in southwestern Ontario and rural children in central Saskatchewan, both groups aged 9 to 12 years. There were two hypotheses in this research project: First, that Old Order Mennonite children would be more physically fit in health-related components than rural children in central Saskatchewan. Second, those Old Order Mennonite children would be more physically active than rural Saskatchewan children.

At the same time, the researcher dealt with the meaningful and useful research methods and statistics in his paper. He selected the sample at random of the families, and the number of the sample was 289 children. The researcher used two items when he deciding on the size of the sample for this research project; statistical power, and feasibility. The researcher used some statistics procedures in his project to obtain the outcomes, which were t-test, univariate analysis of covariance, and a multivariate analysis of covariance. An analysis of covariance, whether univariate or multivariate, is a convenient way of equating groups statistically on factors or covariates, which may influence the dependent variables. The researcher used these tests to compare between the two groups which the tests were cardiovascular endurance, muscular strength, muscular endurance and flexibility.

Physical activity and health related physical fitness in Taiwanese adolescents

Huang and Malina (2002) study showed that the association between habitual physical activity and health related physical fitness in children and adolescents needs further study, especially in different cultural contexts. The study of Taiwanese adolescents is relevant because low levels of physical activity and fitness during adolescence may underlie the potential for several health problems in adults, although the link between activity and fitness during youth and adult health is not clearly established. Therefore, the researcher's aim in this study considered in the relationship between physical activity and health related physical fitness, and evaluated 282 Taiwanese adolescents 12-14 years of age. The subjects were randomly selected from the 7^{th}, 8^{th} and 9^{th} grades in two junior high schools in Taiwan. Physical activity was estimated as total daily energy expenditure and energy expenditure in moderate to vigorous physical activity from 24 hours activity records for three days, two week days and one weekend day. Health related fitness was assessed as the one mile run for cardiorespiratory, timed sit up for abdominal strength and endurance, sit and reach for lower back flexibility. And subcutaneous fatness for sum of the triceps, subscapular, suprailiac, and medial calf skinfold.

Also, the researcher dealt with research methods and statistics in his paper and began by selecting the sample at randomly from the 7^{th} through 9^{th} grades in two junior high schools. The sample was 282 Taiwanese adolescents, 138 boys and 144 girls. The researcher used three tests to evaluate three components of physical fitness related health which is 1 mile run to evaluate cardiorespiratory, timed sit up to evaluate muscular strength and endurance and sit and reach to evaluate flexibility. The researcher used the partial correlation and analysis of covariance to evaluate the relationship between energy expenditure and indicators of health related physical fitness. Partial correlations control the age and were computed between estimated energy expenditure and the four physical fitness variables in the total sample and separately for males and females. At the same time, analysis of covariance was used to compare the health related fitness of active and inactive boys and girls.

Evaluation of health related physical fitness of elementary school students in Libya.

According to Nanis study (2004) people should have knowledge of health-related physical fitness relating to the health and well-being of individuals. Although the benefits of health-related physical fitness have been well documented, so inactivity leads to the risk of diseases. Few studies have examined the level of health-related physical fitness knowledge among allied-health professions. The study **e**valuated the elements of physical fitness related to health of students of elementary school, and compared the level of the elements of physical fitness related

to health of students of the great Jamahiriya with students of other countries according to the availability of data, and the hypothesis are differences of statistical indications between the levels of students of elementary education (city of Al-Nikat Al-khams) and their counterparts from the USA in the elements of muscular strength and body composition in favor of the students of Libya, also, the elements of cardiorespiratory and flexibility in favor of the students of the USA. The researcher used a set of fitness tests related to health to get results to present the realistic outcomes to officials who take care for physical activity, which is the basis of health as we know.

The researcher used research methods to select the sample. He selected the sample at randomly. The sample consisted of 505 students from three different cities (Zwara, Al Gemeel and Regdaleen) age (12-15) year. The students evaluated in four elements of physical fitness related to health which was muscular strength was tested used sit up test, cardiorespiratory was tested used 9 min run, body composition was tested used skinfold and flexibility was tested used sit and reach. After that the researcher used statistics procedures to analysis the measurement results. Also, the researcher used statistics procedures to analyze the data by mean, standard deviation, percentile and analysis of variance to obtain the realistic outcomes.

Reliability of health-related physical fitness tests in European adolescents

Ortega et al study (2008) showed that health-related physical fitness includes the characteristics of functional capacity and is affected by the physical activity level and other lifestyle factors. Maintaining an appropriate level of health-related physical fitness allows a person to meet emergencies, reduce the risk of disease and injury, work efficiently, participate and enjoy physical activity (sports, recreation, leisure) and look one's physical best. A high health-related physical fitness level focuses on optimum health and prevents the onset of disease and problems associated with inactivity at all ages. The aim of study is to examine the reliability of a set of health-related physical fitness tests used in the European Union-funded Healthy Lifestyle in Europe by Nutrition in Adolescence (HELENA) Study on lifestyle and nutrition among adolescents. A set of physical fitness tests was performed twice in a study sample, 2 weeks apart, by the same researchers.

The researcher dealt with the research methods and statistics procedures to analyze the data. The sample selected from cities in different country, Athens and Heraklion (Greece), Dortmund (Germany), Ghent (Belgium), Lille (France), Pe´cs (Hungary), Rome (Italy), Stockholm (Sweden), Vienna (Austria) and Zaragoza (Spain). The sample consists of 240 adolescents who participated in the Helen study. The researcher used a set of physical fitness test to assess the

components of physical fitness related to health which are sit and reach was used to assess flexibility, hand grip was used to assess the strength, standing broad jump used to assess explosive strength, The Bosco protocol is composed of three different jumps used to assess, explosive strength, elastic and intramuscular coordination capacity, bent arm hung used to assess muscular endurance, 4×100 shuttle run used to assess speed, agility and coordination, 20-m shuttle run used to assess cardiorespiratory. The statistics procedures were mean, standard deviation and one way ANOVA.

2.21 Summary of literature review

Presently, there is no conclusive data on the changes in Libya youth fitness over the years. One conclusion that can be made from studies is that children are fatter today than children previously studied. The increasing emergence of CHD risk factors and other diseases in children has alarmed the medical and educational community. Many researchers are now taking a much closer look at the benefits of physical fitness and physical activity in youth. Complicating this picture is the fact that there are no data available on Libya youth fitness.

Physical education is a necessity for the health and well being of every student. Regular physical activity or fitness, a high level of cardiorespiratory fitness and the maintenance of normal weight are strongly associated with several positive health outcomes across the lifespan.

The elements of physical fitness related health are very important for health. Cardiorespiratory endurance reduces the risk of cardiovascular disease. Body composition reduces the risk of cardiovascular disease, reduce the risk of adult –onset diabetes and reduce the risk of cancer. Muscular strength, endurance and flexibility reduce the risk of low back pain, improve functional capacity, improve posture and ability to conduct daily activities. This study was designed to evaluate health related physical fitness of elementary school students in Libya, and compare them with US students.

Chapter 3: Material and research methods

The researcher compared the elements of physical fitness related to health of elementary school students in Libya and compared them with their counterpart from USA. Students were evaluated in four components of health related fitness which were muscular strength, cardiorespiratory endurance, body composition and flexibility by sit-up, 1mile run, skinfold caliper and sit and reach, respectively. The tests were conducted in a hole except 1 mile run was performed in a field. The researcher used some tools in these tests which were a stop watch, skinfold caliper, sit and reach box and cons. The researcher described the tools and instruments, the study organization and data analysis. AAHPERD health related physical fitness test manual study (1983) showed that the norms are to be used to evaluate student performance. (p. 9)

3.1 Research sample

Health related physical fitness test results were obtained from each school in order for these four fitness criteria could be statistically analyzed. The researcher connected schools that subjects were tested. The researcher selected approximately six elementary schools located in different counties namely Zwara, Al Jemel and Regdaleen which were used as sources of data. The students were males and they were 5^{th} and 6^{th} grade pupils aged 10-11 years. At least 311 students were tested. The advantage of this Method was giving a chance for all the students to be tested. (n=311). According to Trochim, 2001, a study showed the methods that follow can be considered subcategories of purposive sampling methods. The researcher chooses highest schools in terms of the number of students. You might sample for specific groups or types of people as in modal instance, expert, or quota sampling. The researcher selected a sample using purposive sampling to provide the first patch of data. The sample comprised of 100 participants for each county however some of the participants were absent or sick. On the other hand, the researcher added some participants to the sample. Consequently the sample is as shown in table 5. In addition, the methods of research were divided into two types. First, the pilot study which helped the researcher identify and ascertain the validity of the tools and instruments, ensure the availability of assistants during the tests, determine a suitable time for implementation of the program, acknowledge the difficulties faced the researcher and assistants during the tests, and understand how the assistants do the initial testing. Second, the researcher used the physical fitness testing related to health which were four tests as mentioned in this study. Furthermore, the researcher used a scientific method that is not widely used in his country because he thinks

these tests will assist him to evaluate and investigate the level of physical fitness and health in his country and comparing them with developed country. The researcher started tests at the beginning of the 2011. The researcher selected the method approach which is suitable for the nature of the research. (p. 56)

Table (7): The numbers of participants and means

City	*Number of participants (Males)*	*Mean*			
		10 years		*11 years*	
		Height	*Weight*	*Height*	*weight*
Aljmeel	***92***	***144.85±8.95***	***49.75±10.70***	***140.94±10.40***	***46.92±10.18***
Regthaleen	***103***	***138.21±7.50***	***38.71±9.85***	***142.28±8.05***	***39.28±7.58***
Zwara	***116***	***137.34±8.63***	***39.52±9.54***	***146.8±9.14***	***41.9±11.41***

Table (7) refers to the number of the participants in all the cities. Aljmeel (92), Regthaleen (103) and Zwara (116). The mean of height and weight for all participants.

3.2 Tools instruments and procedures

A pilot study was completed to ensure clarity and how the research procedures are applied in this study. The actual fitness testing was performed within a fitness tests that contained the following stations: sit-ups, sit and reach, skinfold measures and the one mile run/walk.

Sit and reach box. A box which consisted of a 50 cm ruler was used to measure flexibility of the back. (Lamb, A., Jennifer, 1994) (p. 17, 18)

The procedures of the test as the researcher mentioned in the appendices.

Skinfold caliper. Skinfold caliper (Cambridge Scientific Industries, Inc., Cambridge, MD) was used to measure skinfold thickness. (Lamb, A., Jennifer, 1994) (p. 17, 18)

The procedures of the test as the researcher mentioned in the appendices.

Running track. A six lane, 400 m outdoor track was used as the test site for the one mile run/walk. (Lamb, A., Jennifer, 1994) (p. 17, 18)

The procedures of the test as the researcher mentioned in the appendices.

Stop watch. A Stop watch was used to monitor the time for the one mile run/walk and 1min set up test. . (Lamb, A., Jennifer, 1994) (p. 17, 18)

The procedures of the test as the researcher mentioned in the appendices.

Table (8) Produced battery of tests and measurements

Test	*Element measured*	*Unit*
1 mile run	*Cardiorespiratory endurance*	*min and sec*
Sit up test	*Muscular strength*	*Repetition*
Sit and reach	*Flexibility*	*cm*
Skinfold caliper	*Body composition*	*mm*

Table (9) Two different skinfold sites

Aria	***Unit***
Subscapular	*Mm*
Triceps	*Mm*

3.3 The organization of research

The researcher begins his survey in early 2011. He started to contact schools in 16/01/2011 by sending letters to education offices to obtain permission from the people in charge. The researcher contacted schools before starting this survey to demonstrate to the students the procedures of the tests, and what are the tools that were going to be used during the tests to have a forehand experience and become familiar with them. Also contacted were the assistants in order to show them how the tests are performed and their procedure. He worked on the industry measuring device flexibility according to the standards.

3.4 Data analysis

In 2005 Jerry et al study showed that statistics are simply an objective means of interpreting a collection of observation. Various statistical techniques are necessary to describe the characteristics of data, test relationships between sets of data and test the differences among sets of data. The researcher therefore analyzed the data using basic statistical procedures which are the mean, standard deviation, skewness, the percentile, analysis of variance and regression. The researcher also used SAS and SPSS statistical application programs to illustrate the outcome. First of all, the mean which is a commonly used method of describing central tendency. Secondly, standard deviation is also important to use as an indicator of dispersion. Thirdly, the percentile was used to divide data into 99 parts and provide information about how the data spread from smallest to largest value. Fourthly, the researcher used the skewness to show the homogenous for the sample. Fifthly, regression analysis is a statistical tool used for investigating relationships between variables. Usually, the investigator seeks to ascertain the causal effect of one variable upon another. Sixthly, analysis of variance was used to compare more than two groups. Finally, graphics and tables were used to explain or demonstrate to the reader how the outcomes were obtained. (p. 97)

The statistical procedures used by the researcher to analyze the data are follow as:

1. The mean.
2. Standard deviation.
3. Skewness.
4. The percentile.
5. Analysis of variance.

6. Regression.
7. Graphics.
8. Tables.

Descriptive statistics were performed on all health related fitness components. Analyzes of variance were also calculated to determine significant differences ($p \leq .05$) between the subjects for the three cities in terms of the health-related components as regards to physical fitness. Current physical fitness levels were then evaluated by health-related criteria for each component of health related physical fitness. These components were: muscular strength, flexibility, body composition and cardiorespiratory endurance.

3.5 Pilot study

The researcher conducted the first survey for random sample of (15) students from primary schools. The first part was taken from outside the study sample dated 17.01.2011 to 22.01.2011 in order to identify the following:

1. Validity of the instruments and devices used in the research.
2. Ensure the availability of a sufficient number of assistants during the implementation of the tests.
3. Determine the right time to implement the research work.
4. Know the extent of understanding of the assistants to perform the measurements and the testing procedures.
5. Knowledge of the difficulties that may face the researcher and assistants during the implementation of research procedures.
6. Ensure appropriate measurements and tests are applied to the sample reconnaissance.

Chapter 4: Results

This study was designed to evaluate the health-related fitness level of Libyan students in three different cities which are namely Aljmeel, Regthaleen and Zwara. The physical Fitness Test battery, which includes measures of muscular strength, flexibility, body composition, and cardiorespiratory endurance, was used. The following schools participated in the survey: Alshoumokh, Omar Ibn Alkhatab, Alfajer Eljadeed, Azahef Alakdar, Alshuhada and 2nd of March. The subjects involved in this study were 311 students. The ($p \leq .05$) level was used to determine significant differences between the three cities in terms of health-related components of physical fitness. On the other hand, to compare Libyan students and their counterpart from USA, the participants' characteristics and a discussion of the physical fitness variables are presented in this chapter. Sum of skinfolds, Tricep and subscapular, sit up, 1 mile run, sit and reach, are the variables which were analyzed and compared in this study.

4.1 Part 1: Results for all districts who participated in the experiment

The tables below show the values for all participants who participated within the experiment to measure the four components of physical fitness related health, cardiorespiratory endurance (1 mile run), muscular strength (sit-up test for abdominal), body composition (triceps and subscapular) and flexibility (sit and reach for back). The tables show the values of mean, standard deviation, skewness, percentile, regression and analysis of variance. The tables illustrate a comparison between the three cities: Aljmeel, Regthaleen and Zwara. SAS and SPSS statistical application programs were used to obtain the results.

Table (10) minimum, maximum, mean, std, std.err and skewness for high, weight, cardiorespiratory, strength, flexibility and skinfold in different cities and ages.

N= 311

	Minimum	***maximum***	***Mean***	***Std***	***Std.Error of mean***	***Skewness***
High	*120.00*	*170.00*	*141.832*	*9.405*	*0.533*	*0.44*
Weight	*23.00*	*75.00*	*42.398*	*10.592*	*0.006*	*0.76*
Cardio	*8.35*	*16.20*	*10.957*	*1.578*	*0.089*	*0.66*
Strength	*1.00*	*45.00*	*20.045*	*11.690*	*0.662*	*0.11*
Flexibility	*1.00*	*29.00*	*13.865*	*6.024*	*0.341*	*0.22*
Skinfold	*6.000*	*63.000*	*17.546*	*9.973*	*0.565*	*1.95*

Table 10 shows the mean ± std value for height, weight, cardiorespiratory, muscular strength, flexibility and skinfold are (141.832 ± 9.405), (42.398 ±10.592), (10.957 ± 1.579), (20.045 ± 11.690), (13.865 ± 6.024), skinfold is (17.546 ± 9.973) respectively. The skewness appears homogenous of the sample. The values are less than (+3 & -3).

Table (11) minimum, maximum, mean, std, std.err and skewness for high, weight, cardiorespiratory, strength, flexibility and skinfold in different cities age 10. N= 139

	Minimum	*maximum*	*Mean*	*Std*	*Std.Error of mean*	*Skewness*
high	*120.000*	*165.000*	*139.820*	*8.966*	*0.760*	*.799*
Weight	*26.000*	*75.000*	*42.295*	*11.038*	*0.936*	*.807*
Cardio	*8.590*	*16.200*	*10.953*	*1.495*	*0.126*	*2.355*
Strength	*1.000*	*45.000*	*19.410*	*11.054*	*0.937*	*.218*
Flexibility	*1.000*	*29.000*	*14.007*	*6.192*	*0.525*	*.027*
Skinfold	*6.000*	*63.000*	*16.647*	*9.794*	*0.830*	*.445*

Table (11) refers to the mean ± std value for height, weight, cardiorespiratory, strength, flexibility and skinfold are (139.820 ± 8.966), (42.295 ± 11.038), (10.953 ± 1.495), (19.410 ± 11.045), (14.007 ± 6.192), (16.647 ± 9.794) respectively. The skewness appears homogenous of the sample. The values are less than (+3 & -3).

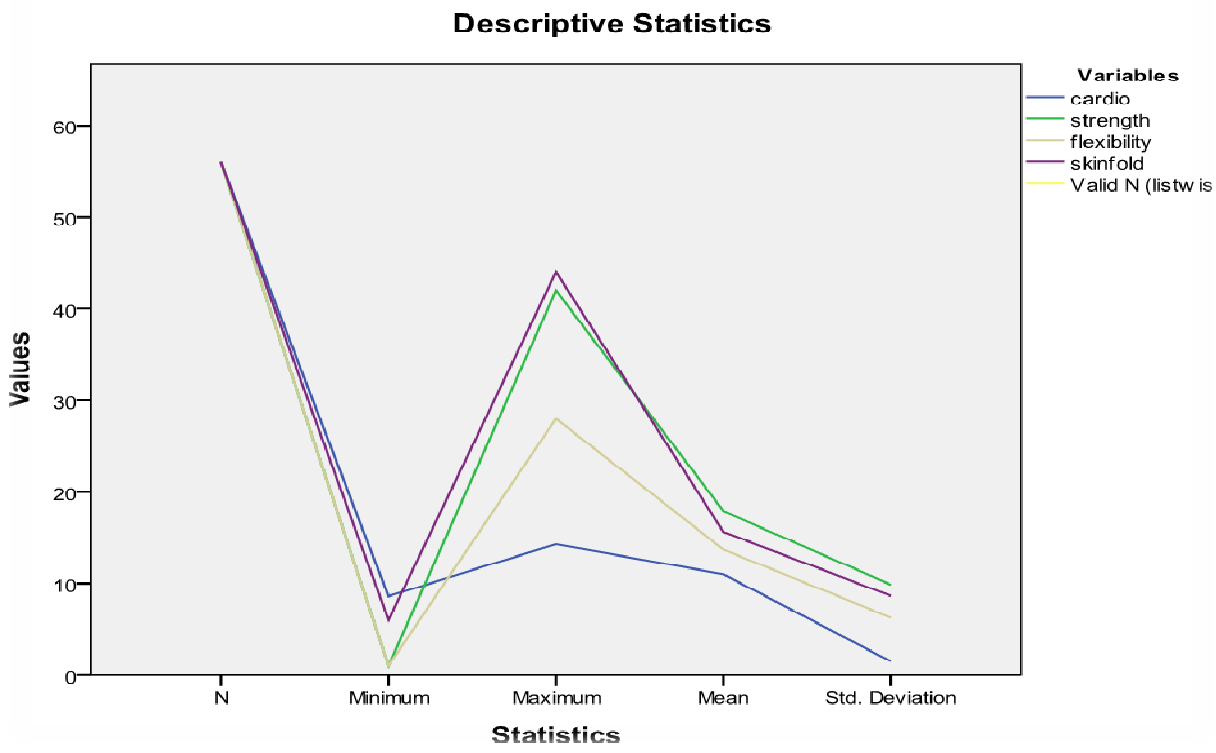

Figure 5: *Minimum, maximum, mean, std, std.err and skewness for high, weight, cardiorespiratory, strength, flexibility and skinfold in different cities age 10.*

Table (12) minimum, maximum, mean, std std.err and skewness for high, weight, cardiorespiratory, strength, flexibility and skinfold in different cities age 11. N=172

	Minimum	*maximum*	*Mean*	*Std*	*Std.Error of mean*	*Skewness*
high	*120.000*	*170.000*	*143.459*	*9.462*	*0.721*	*.733*
Weight	*23.000*	*75.000*	*42.482*	*10.249*	*0.781*	*.196*
Cardio	*8.350*	*16.200*	*10.961*	*1.647*	*0.125*	*1.686*
Strength	*1.000*	*45.000*	*20.558*	*12.188*	*0.929*	*.229*
Flexibility	*1.000*	*29.000*	*13.750*	*5.900*	*0.450*	*.140*
Skinfold	*7.000*	*54.000*	*18.273*	*10.084*	*0.769*	*.796*

Table (12) shows the mean ± std value for height, weight, cardiorespiratory, strength, flexibility and skinfold are (143.459 ± 9.462), (42.482 ± 10.249), (10.961 ± 1.647), (20.558 ± 12.188), (13.750 ± 5.900), (18.273 ± 10.084) respectively. The skewness appears homogenous of the sample. The values are less than (+3 & -3).

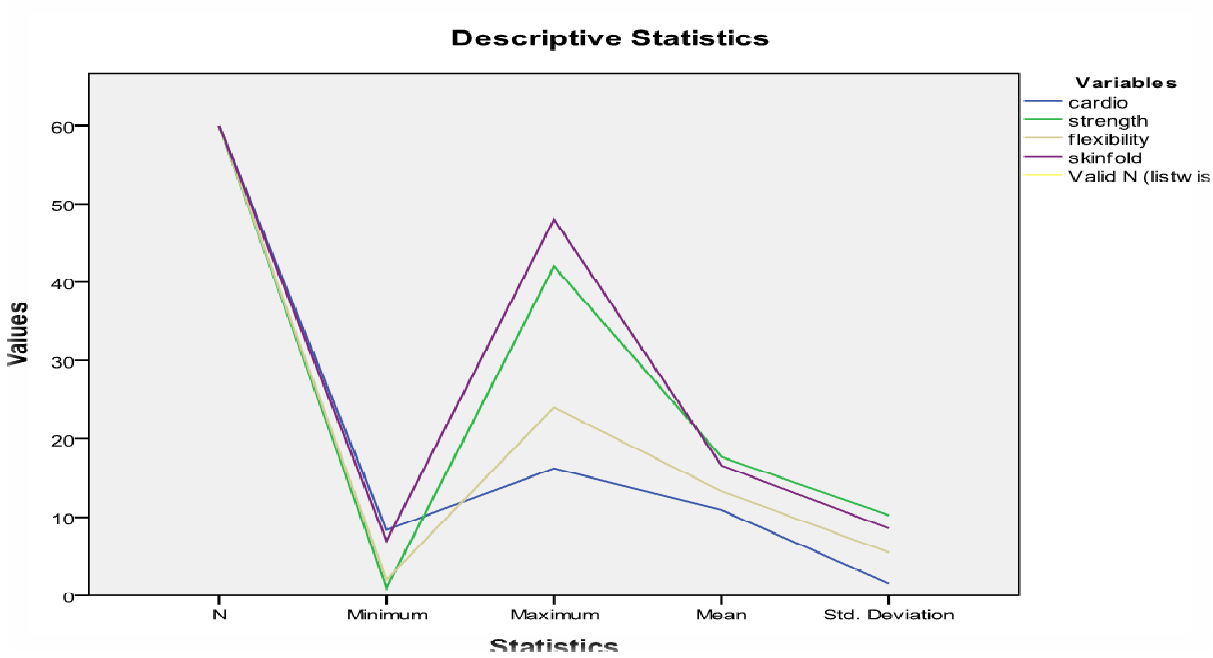

Figure 6: *Minimum, maximum, mean, std std.err and skewness for high, weight, cardiorespiratory, strength, flexibility and skinfold in different cities age 11.*

Table (13) minimum, maximum, mean, std, stderr and skewness for high, weight, cardiorespiratory, strength, flexibility and skinfold in Aljmeel city. N= 92

	Minimum	*maximum*	*Mean*	*Std*	*Std.Error of mean*	*Skewness*
high	*120.000*	*165.000*	*142.684*	*9.924*	*1.034*	*.396*
Weight	*28.000*	*75.000*	*48.184*	*10.454*	*1.089*	*.156*
Cardio	*8.590*	*16.200*	*10.910*	*1.621*	*.1690*	*1.621*
Strength	*1.000*	*45.000*	*20.021*	*13.317*	*1.388*	*.342*
Flexibility	*2.000*	*29.000*	*14.478*	*6.632*	*.691*	*.155*
Skinfold	*7.000*	*54.000*	*19.445*	*11.059*	*1.153*	*.918*

Table (13) appears the mean ± std value for height, weight, cardiorespiratory, strength, flexibility and skinfold are (142.684 ± 9.924), (48.184 ± 10.454), (10.910 ± 1.621), (20.021 ± 13.317), (14.478 ± 6.632), (19.445 ± 11.059) respectively. The skewness appears homogenous of the sample. The values are less than (+3 & -3).

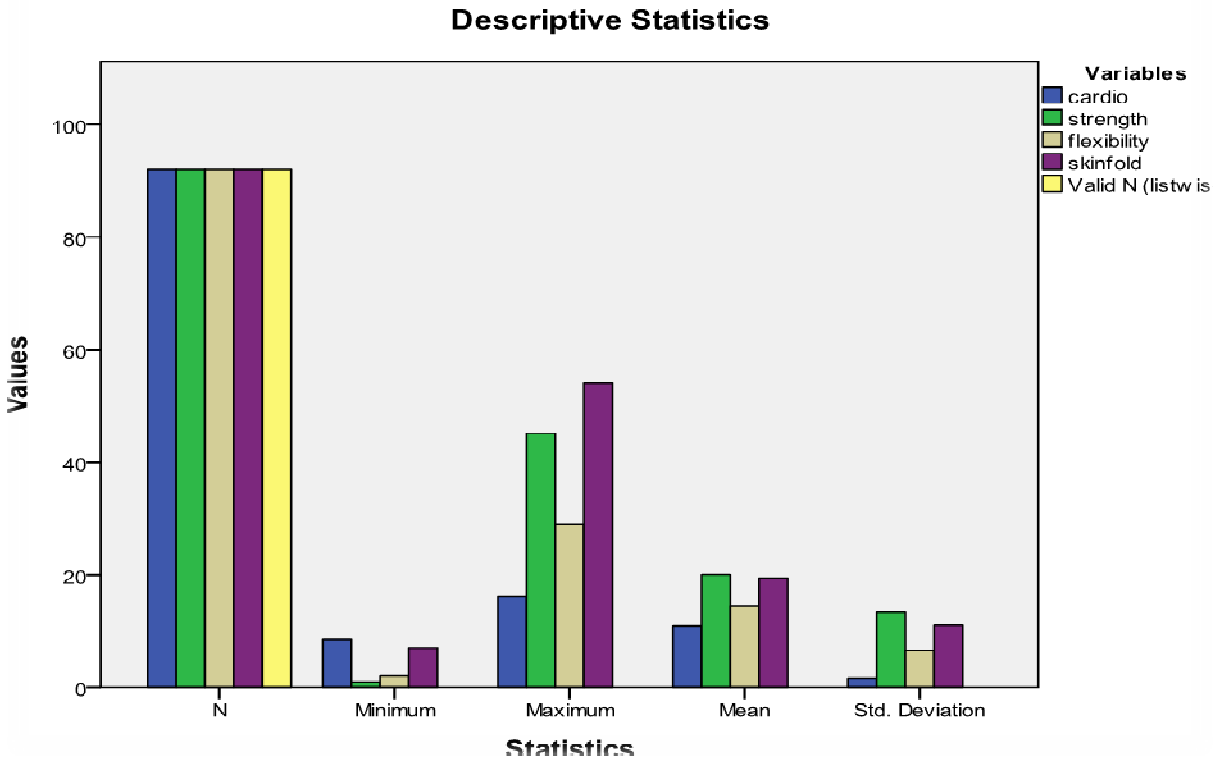

Figure 7: *Minimum, maximum, mean, std, stderr and skewness for high, weight, cardiorespiratory, strength, flexibility and skinfold in Aljmeel city.*

Table (14) minimum, maximum, mean, std, stderr and skewness for high, weight, cardiorespiratory, strength, flexibility and skinfold in Reghdaleen city. N= 103

	Minimum	*maximum*	*Mean*	*Std*	*Std.Error of mean*	*Skewness*
high	*127.00*	*165.000*	*140.621*	*8.049*	*.793*	*1.294*
Weight	*28.00*	*75.000*	*39.048*	*8.536*	*.8411*	*.744*
Cardio	*8.350*	*16.200*	*11.021*	*1.659*	*.163*	*2.269*
Strength	*1.000*	*44.000*	*22.621*	*11.475*	*1.130*	*.092*
Flexibility	*1.000*	*28.000*	*13.733*	*5.663*	*.558*	*-.160*
Skinfold	*7.000*	*63.000*	*17.456*	*10.238*	*1.008*	*.617*

Table (14) showed the mean ± std value for height, weight, cardiorespiratory, strength, flexibility and skinfold are (140.621 ± 8.049), (39.048 ± 8.536), (11.021 ± 1.659), (22.621 ± 11.475), (13.733 ± 5.663), (17.456 ± 10.238) respectively. The skewness appears homogenous of the sample. The values are less than (+3 & -3).

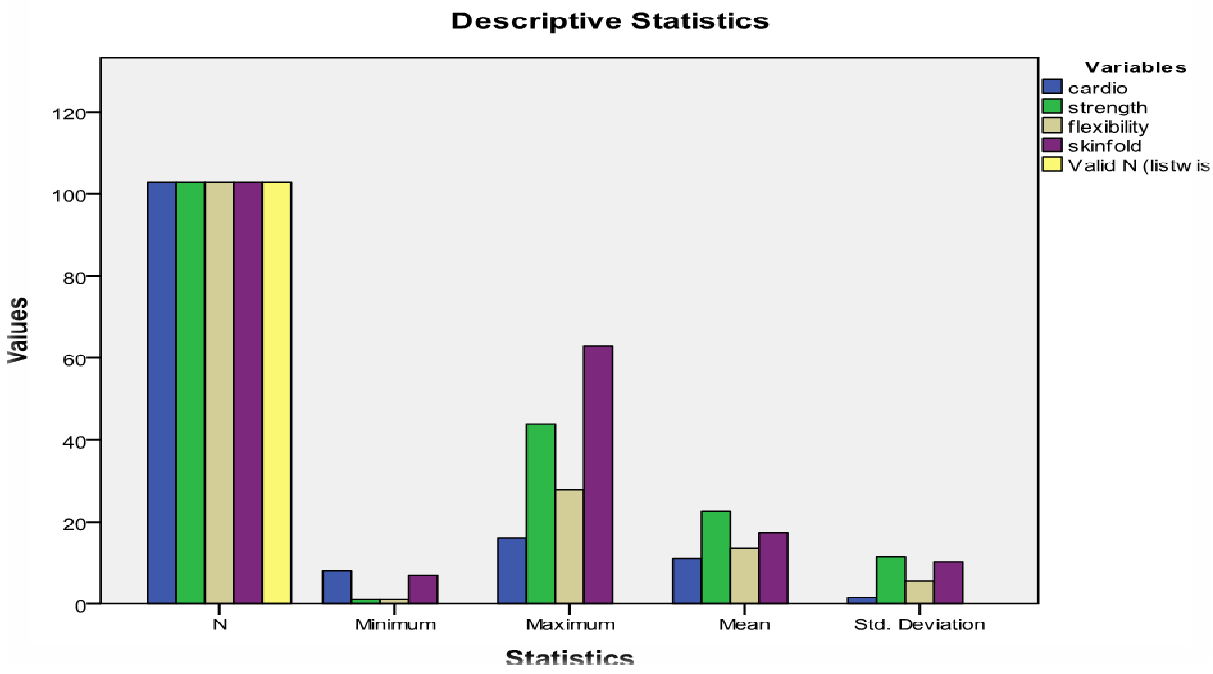

Figure 8: *Minimum, maximum, mean, std, stderr and skewness for high, weight, cardiorespiratory, strength, flexibility and skinfold in Reghdaleen city.*

Table (15) minimum, maximum, mean, std, stderr and skewness for high, weight, cardiorespiratory, strength, flexibility and skinfold in Zwara city. N= 116

	Minimum	*maximum*	*Mean*	*Std*	*Std.Error of mean*	*Skewness*
high	*120.000*	*170.000*	*142.232*	*10.049*	*.933*	*.835*
Weight	*23.000*	*75.000*	*40.784*	*10.576*	*.891*	*.430*
Cardio	*8.350*	*16.200*	*10.938*	*1.480*	*.137*	*1.855*
Strength	*1.000*	*42.000*	*17.776*	*10.006*	*.929*	*.130*
Flexibility	*1.000*	*28.000*	*13.495*	*5.840*	*.542*	*.190*
Skinfold	*6.000*	*48.000*	*16.120*	*8.568*	*.795*	*.463*

Table (15) allude to the mean ± std value for height , weight , cardiorespiratory, strength, flexibility and skinfold are (142.232 ± 10.049), (40.784 ± 10.006), (10.938 ± 1.480), (17.776 ± 10.006), (13.495 ± 5.840), (16.120 ± 8.568) respectively . The skewness appears homogenous of the sample. The values are less than (+3 & -3) .

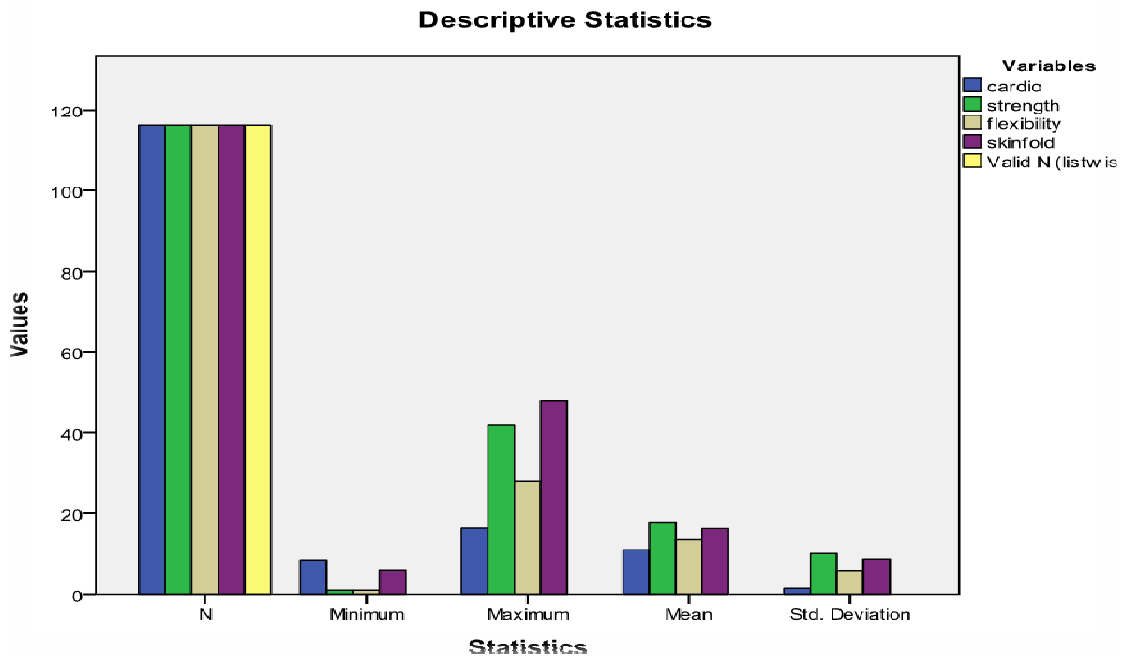

Figure 9: *Minimum, maximum, mean, std, stderr and skewness for high, weight, cardiorespiratory, strength, flexibility and skinfold in Zwara city.*

Table (16) minimum, maximum, mean, std and stderr for high, weight, cardiorespiratory, strength, flexibility and skinfold for age (10) Aljmeel city.

N= 41

	Minimum	*maximum*	*Mean*	*Std*	*Std.Error of mean*
high	*130.000*	*165.000*	*144.853*	*8.948*	*1.397*
Weight	*30.000*	*75.000*	*49.756*	*10.697*	*1.670*
Cardio	*8.590*	*14.300*	*10.991*	*1.488*	*0.232*
Strength	*1.000*	*45.000*	*20.170*	*12.899*	*2.014*
Flexibility	*2.000*	*29.000*	*14.292*	*6.404*	*1.000*
Skinfold	*7.000*	*51.000*	*17.804*	*8.608*	*1.344*

Table (16) shows the mean ± std value for height , weight , cardiorespiratory, strength, flexibility and skinfold are (144.853 ± 8.948), (49.756 ± 10.697), (10.991± 1.488), (1.000 ± 45.000), (20.170 ± 12.899), (14.292 ± 6.404), (17.804 ± 8.608) respectively .

Table (17) minimum, maximum, mean, std and stderr for high, weight, cardiorespiratory, strength, flexibility and skinfold for age (10) Reghdaleen city.

N= 42

	Minimum	*maximum*	*Mean*	*Std*	*Std.Error of mean*
high	*127.000*	*165.000*	*138.214*	*7.501*	*1.157*
Weight	*28.000*	*75.000*	*38.714*	*9.850*	*1.520*
Cardio	*8.590*	*16.200*	*10.861*	*1.554*	*0.239*
Strength	*1.000*	*40.000*	*20.690*	*10.632*	*1.640*
Flexibility	*1.000*	*28.000*	*14.142*	*6.022*	*0.929*
Skinfold	*7.000*	*63.000*	*16.881*	*12.155*	*1.875*

Table (17) refers to the mean ± std value for height , weight , cardiorespiratory, strength, flexibility and skinfold are (138.214 ± 7.501), (38.714 ± 9.850), (10.861 ± 1.554), (20.690 ± 10.632), (14.142± 6.022), (16.881 ± 12.155) respectively .

Table (18) minimum, maximum, mean, std and stderr for high, weight, cardiorespiratory, strength, flexibility and skinfold for age (10) Zwara city.

N= 56

	Minimum	*maximum*	*Mean*	*Std*	*Std.Error of mean*
high	*120.000*	*165.000*	*137.339*	*8.626*	*1.152*
Weight	*26.000*	*66.000*	*39.517*	*9.540*	*1.274*
Cardio	*8.590*	*14.300*	*10.993*	*1.480*	*0.197*
Strength	*1.000*	*42.000*	*17.892*	*9.863*	*1.318*
Flexibility	*1.000*	*28.000*	*13.696*	*6.257*	*0.836*
Skinfold	*6.000*	*44.000*	*15.625*	*8.635*	*1.153*

Table (18) allude to the mean ± std value for height, weight, cardiorespiratory, strength, flexibility and skinfold are (137.339 ± 8.626), (39.517 ± 9.540), (10.993 ± 1.480), (17.892 ± 9.863), (13.696 ± 6.257), (15.625 ± 8.635) respectively.

Table (19) minimum, maximum, mean, std and stderr for high, weight, cardiorespiratory, strength, flexibility and skinfold for age (11) Aljmeel city.

N= 51

	Minimum	*maximum*	*Mean*	*Std*	*Std.Error of mean*
high	*120.000*	*162.000*	*140.941*	*10.404*	*1.457*
Weight	*28.000*	*71.000*	*46.921*	*10.184*	*1.426*
Cardio	*8.590*	*16.200*	*10.845*	*1.732*	*0.242*
Strength	*1.000*	*45.000*	*19.902*	*13.771*	*1.928*
Flexibility	*3.000*	*29.000*	*14.627*	*6.870*	*0.962*
Skinfold	*8.000*	*54.000*	*20.764*	*12.623*	*1.767*

Table (19) appears the mean ± std value for height, weight, cardiorespiratory, strength, flexibility and skinfold are (140.941 ± 10.404), (46.921 ± 10.184), (10.845 ± 1.732), (19.902 ± 13.771), (14.627 ± 6.870), (20.764 ± 12.623) respectively.

Table (20) minimum, maximum, mean, std and stderr for high, weight, cardiorespiratory, strength, flexibility and skinfold for age (11) Reghdaleen city.

N= 61

	Minimum	*maximum*	*Mean*	*Std*	*Std.Error of mean*
high	*127.000*	*160.000*	*142.278*	*8.052*	*1.031*
Weight	*28.000*	*58.000*	*39.278*	*7.578*	*0.970*
Cardio	*8.350*	*16.200*	*11.132*	*1.732*	*0.221*
Strength	*2.000*	*44.000*	*23.950*	*11.925*	*1.526*
Flexibility	*1.000*	*28.000*	*13.450*	*13.450*	*0.696*
Skinfold	*7.000*	*48.000*	*17.852*	*8.765*	*1.122*

Table (20) shows the mean ± std value for height , weight , cardiorespiratory, strength, flexibility and skinfold are (142.278 ± 8.052), (39.278 ± 7.578), (11.132 ± 1.732), (23.950 ± 11.925), (13.450 ± 13.450), (17.852 ± 8.765) respectively .

Table (21) minimum, maximum, mean, std and stderr for high, weight, cardiorespiratory, strength, flexibility and skinfold for age (11) Zwara city.

N= 60

	Minimum	*maximum*	*Mean*	*Std*	*Std.Error of mean*
High	*129.000*	*170.000*	*146.800*	*9.140*	*1.180*
Weight	*23.000*	*75.000*	*41.966*	*11.412*	*1.473*
Cardio	*8.350*	*16.200*	*10.886*	*1.491*	*0.192*
Strength	*1.000*	*42.000*	*17.666*	*10.219*	*1.319*
Flexibility	*2.000*	*24.000*	*13.308*	*5.468*	*0.706*
Skinfold	*7.000*	*48.000*	*16.583*	*8.551*	*1.104*

Table (21) refers to the mean ± std value for height, weight, cardiorespiratory, strength, flexibility and skinfold are (146.800 ± 9.140), (41.966 ± 11.412), (10.886 ± 1.491), (17.666 ± 10.219), (13.308 ± 5.468), (16.385 ± 8.551) respectively.

4.2 Part 2: Analysis of variance for all districts.

Tables showed the significance differences or non significances differences between the city, age, city and age in the components of health related physical fitness. It was significance differences in muscular strength and body composition in favor to Zwara city.

Table (22) Analysis of variance for factors affecting on cardiorespiratory endurance model (1)

Source	*DF*	*ANOVA SS*	*Mean Square*	*F Value*	*Pr > F*
Age	*1*	*0.005*	*0.005*	*0.00*	*0.962*
Ctiy	*2*	*0.668*	*0.334*	*0.13*	*0.876*
*City*Age*	*2*	*2.642*	*1.321*	*0.52*	*0.593*
Error	*305*	*769.546*	*2.523*		
Total	*310*	*772.862*			

ANOVA for factors affecting on cardiorespiratory are shown in the table (22). None of factors age, city and interaction between city and age affected cardiorespiratory endurance significant which are (0,962), (0,876), (0,593), respectively ($p > 0.05$)

Table (23) Analysis of variance for factors affecting on muscular strength model (1)

Source	*DF*	*ANOVA SS*	*Mean Square*	*F Value*	*Pr > F*
Age	*1*	*101.325*	*101.325*	*0.76*	*0.385*
City	*2*	*1281.007*	*640.504*	*4.79*	*0.009*
*City*Age*	*2*	*166.202*	*83.101*	*0.62*	*0.538*
Error	*305*	*40818.833*	*133.832*		
Total	*310*	*42367.369*			

ANOVA for factors affecting on muscular strength are shown in the table (23). It can observed that effects of age and city*age are not significant which are (age=0,385, city*age=0,538), ($p > 0.05$), but the effect of city is significant which is (0.009), ($p < 0.05$).

Table (24) compression of means by Duncan for factors effecting muscular strength.

City	**
Aljmeel	*20.02 ± 13.317* *a*
Regthaleen	*22.62 ± 11.475* *a*
Zwara	*17.77 ± 10.006* *b*
Age	*NS*
10	*19.41 ± 11.054* *a*
11	*20.55 ± 12.188* *a*
City×Age	*NS*
Aljmeel × 10	*20.17± 12.90*
Aljmeel × 11	*19.90± 13.77*
Regthaleen × 10	*20.69± 10.63*
Regthaleen × 11	*23.95± 11.92*
Zwara × 10	*17.892± 9.86*
Zwara × 11	*17.66± 10.22*

**Highly significant at level 1%

The same letters are non significantly different (a), (b) refers to significantly different.

Table (24) showed that there is no significantly different in age and city and age, but there is significantly different in city (*0.009),* (17.77 ± 10.006) which is Zwara on muscular strength trait.

Table (25) Analysis of variance for factors affecting on flexibility model (1)

Source	*DF*	*ANOVA SS*	*Mean Square*	*F Value*	*Pr > F*
Age	*1*	*5.085*	*5.085*	*0.14*	*0.7098*
Ctiy	*2*	*52.215*	*26.108*	*0.71*	*0.4913*
*City*Age*	*2*	*13.737*	*6.868*	*0.19*	*0.8292*
Error	*305*	*11178.789*	*36.651*		
Total	*310*	*11249.828*			

ANOVA for factors affecting on flexibility are shown in the table (25). It can observe that effects of age, city and city*age are not significant on flexibility, which are (0.7098, 0.4913, and 0.8292) respectively, ($p > 0.05$)

Table (26) Analysis of variance for factors affecting on skinfold model (1)

Source	*DF*	*ANOVA SS*	*Mean Square*	*F Value*	*Pr > F*
Age	*1*	*203.190*	*203.190*	*2.06*	*0.15*
Ctiy	*2*	*568.482*	*284.241*	*2.89*	*0.05*
*City*Age*	*2*	*46.001*	*23.000*	*0.23*	*0.79*
Error	*305*	*30015.400*	*98.411*		
Total	*310*	*30833.074*			

ANOVA for factors affecting on skinfold are shown in the table (26) there are none of factors age and interaction between city and age affected cardiorespiratory significant which are (015, 0.79) respectively ($p > 0.05$), but there are significantly different by city which is 0.05 ($p < 0.05$) .

Table (27) Compression of means by Duncan for factors effecting skinfold.

City	**
Aljmeel	*19.44 ±11.059 a*
Regthaleen	*17.45 ±10.238 a*
Zwara	*16.12 ±8.568 b*
Age	*NS*
10	*16.19 ±*
11	*18.27 ±*
City×Age	*NS*
Aljmeel × 10	*17.80 ± 8.60*
Aljmeel × 11	*20.76 ± 12.62*
Regthaleen × 10	*16.88 ± 12.15*
Regthaleen × 11	*17.85 ± 8.76*
Zwara × 10	*15.62 ± 8.63*
Zwara × 11	*16.58 ± 8.55*

**Highly significant at level 1%

The same letters are non significantly different (a), (b) refers to significantly different.

Table (27) showed that there is no significantly different in age and city and age, but there is significantly different in city (*0.05*) (16.12 ± 8.568) which is Zwara on skinfold trait.

Regression coefficient values for height and weight for the elements of health related physical fitness.

There are effects of height and weight in the all the elements of health related physical fitness, some of them increase and the others decrease.

Table (28) Analysis of variance for factors affecting on cardiorespiratory endurance model (2)

Source	*DF*	*Anova SS*	*Mean Square*	*F Value*	*Pr > F*
Age	*1*	*0.114*	*0.114*	*0.05*	*0.828*
Ctiy	*2*	*6.913*	*3.456*	*1.43*	*0.241*
*City*Age*	*2*	*2.485*	*1.242*	*0.51*	*0.599*
Height	*1*	*2.573*	*2.573*	*1.06*	*0.303*
Weight	*1*	*35.608*	*35.608*	*14.71*	*0.001*
Error	*303*	*733.490*	*2.420*		
Total	*310*	*772.862*			

ANOVA for factors affecting on cardiorespiratory endurance, model (2) are noticed in the table (28). All factors affected cardiorespiratory endurance trait were not significant which are (0.828, 0.241, 0.599, 0.303) ($p > 0.05$), except effect of weight was significantly different which is *0.001*, ($p < 0.01$)

Table (29) Regression of cardiorespiratory endurance on height and weight.

Intercept	*10.96 ±1.50*
Height	*- 0.011 ± 0.01*
Weight	*0.037 ± 0.009*

Regression of height and weight in cardiorespiratory endurance were observed in table (29). From results above it can derives that if the height increase 1cm the cardiorespiratory endurance will decrease by 0.011, will if the weight increase 1kg the cardiorespiratory endurance will increase by 0.037.

Table (30) Analysis of variance for factors affecting on muscular strength model (2)

Source	*DF*	*Anova SS*	*Mean Square*	*F Value*	*Pr > F*
Age	*1*	*27.247*	*27.247*	*0.21*	*0.647*
Ctiy	*2*	*1213.926*	*606.963*	*4.66*	*0.010*
*City*Age*	*2*	*212.478*	*106.239*	*0.82*	*0.443*
Height	*1*	*210.670*	*210.670*	*1.62*	*0.204*
Weight	*1*	*1324.360*	*1324.360*	*10.16*	*0.001*
Error	*303*	*39493.434*	*130.341*		
Total	*310*	*42367.369*			

ANOVA for factors affecting on muscular strength, model (2) are noticed in the table (30). All factors affected muscular strength trait were not significant which are (age=0.647, city and age=0.443, height=0.204) ($p > 0.05$) , except effect of city and weight were significantly different which are (city=0.001, weight=0.001) ($p < 0.01$)

Table (31) Regression of muscular strength on height and weight.

Intercept	*12.31 ±11.04*
Height	*0.10 ± 0.08*
Weight	*-0.23 ± 0.07*

Regression of height and weight in muscular strength were observed in table (31). From results above it can derives that if the height increase 1cm the strength will increase by (0.10), while if the weight increase 1kg the strength will decrease (0.23).

Table (32) Analysis of variance for factors affecting on flexibility model (2)

Source	*DF*	*ANOVA SS*	*Mean Square*	*F Value*	*Pr > F*
Age	*1*	*2.106*	*2.106*	*0.06*	*0.809*
Ctiy	*2*	*123.566*	*61.783*	*1.71*	*0.183*
*City*Age*	*2*	*5.610*	*2.805*	*0.08*	*0.925*
Height	*1*	*11.0138*	*11.013*	*0.30*	*0.581*
Weight	*1*	*142.736*	*142.736*	*3.94*	*0.048*
Error	*303*	*10965.875*	*36.191*		
Total	*310*	*11249.828*			

ANOVA for factors affecting on flexibility, model (2) are noticed in the table (32). All factors affected flexibility trait were not significant which are (0.809, 0.183, 0.925, 0.581) ($p > 0.05$, except effect of weight was significantly different which is *0.048*, ($p < 0.05$)

Table (33) Regression of flexibility on height and weight.

Intercept	*19.83 ±5.82*
Height	*-0.02 ± 0.04*
Weight	*-0.07 ± 0.04*

Regression of flexibility on height and weight are observed in table (33). From results above it can derives that if the height increase 1cm the flexibility will decrease by (0.02), while if the weight increase 1kg the flexibility will decrease (0.07).

Table (34) Analysis of variance for factors affecting on skinfold model (2)

Source	*DF*	*ANOVA SS*	*Mean Square*	*F Value*	*Pr > F*
Age	*1*	*493.140*	*493.140*	*6.90*	*0.009*
Ctiy	*2*	*289.270*	*144.635*	*2.02*	*0.134*
*City*Age*	*2*	*23.036*	*11.518*	*0.16*	*0.851*
Height	*1*	*2005.425*	*2005.425*	*28.04*	*0.001*
Weight	*1*	*8206.586*	*8206.586*	*114.76*	*0.001*
Error	*303*	*21668.133*	*71.512*		
Total	*310*	*30833.073*			

ANOVA for factors affecting on skinfold, model (2) are noticed in the table (34). Factors city and city*age affected skinfold trait were not significant which are (city=0.134, city*age=0.851) ($p > 0.05$, but effect of age, height and weight were significantly different which are (age=0.009, height=0.001, weight=0.001) ($p < 0.05$)

Table (35) Regression of skinfold on height and weight.

Intercept	*38.77 ±8.18*
Height	*- 0.31 ± 0.06*
Weight	*0.56 ± 0.05*

Regression of skinfold on height and weight are observed in table (35). From results above it can derives that if the height increase 1cm the skinfold will decrease by 0.31, while if the weight increase 1kg the skinfold will increase by 0.56.

4.3 Part 3: Percentile norms for Libyan and American students.

Tables showed the comparison between Libyan students and USA students by percentiles. The values referred to the highly differences between Libyan students and USA students in the components of health related physical fitness in favor to USA students.

Table (36). Percentile norms for Libyan and American students Age 10 for the one mile run (minutes and seconds) in cardiorespiratory endurance. N = 139

Percentile	*1 mile run in minute Age 10*	
	Libya	*USA*
5	*8.8*	*6.25*
10	*9.12*	*6.56*
15	*9.22*	*7.26*
20	*9.48*	*7.4*
25	***9.58***	***7.57***
30	*9.9*	*8.1*
35	*10*	*8.23*
40	*10.32*	*8.34*
45	*10.43*	*8.49*
50	***11.25***	***9.03***
55	*11.3*	*9.19*
60	*11.45*	*9.34*
65	*11.5*	*9.45*
70	*12*	*10.1*
75	***12.2***	***10.38***
80	*12.4*	*11.05*
85	*12.5*	*11.31*
90	*12.8*	*12.11*
95	*13.3*	*13*
99	*15.44*	*14.28*

Table (36) refers the proportions of the results of cardiorespiratory endurance, which are the results for USA students higher than there counterpart from Libyan students. The percentiles for USA students are (25) the lowest percentile is 7.57, (50) the middle percentile is 9.03 and (75) the highest percentile is 10.38. Libyan student's percentiles are 9.58, 11.25 and 12.2 respectively.

Table (37). Percentile norms for Libyan and American students Age 11 for the one mile run (minutes and seconds) in cardiorespiratory endurance. N = 172

Percentile	*1 mile run in minute Age 11*	
	Libya	*USA*
5	*8.59*	*6.04*
10	*9.12*	*6.50*
15	*9.22*	*7.19*
20	*9.44*	*7.30*
25	***9.51***	***7.48***
30	*9.9*	*8.00*
35	*10.21*	*8.08*
40	*10.39*	*8.21*
45	*10.51*	*8.39*
50	***11.13***	***8.56***
55	*11.15*	*9.06*
60	*11.25*	*9.25*
65	*11.32*	*9.46*
70	*11.50*	*10.10*
75	***11.7***	***10.40***
80	*12.26*	*11.31*
85	*12.51*	*12.02*
90	*13.33*	*12.40*
95	*13.57*	*13.37*
99	*16.20*	*15.25*

Table (37) shows the proportions of the results of cardiorespiratory, which are the results for USA students higher than there counterpart from Libyan students. The percentiles for USA students are (25) the lowest percentile is 7.48, (50) the middle percentile is 8.56 and (75) the highest percentile is 10.40. Libyan student's percentiles are 9.51, 11.13 and 11.7 respectively.

Table (38). Percentile norms for Libyan and American students Age 10 for sit-up test (repetition) in muscular strength. N = 139

Percentile	*Sit up / repetition Age 10*	
	Libya	*USA*
5	*1*	*15*
10	*1*	*19*
15	*7*	*23*
20	*1*	*25*
25	***12***	***27***
30	*14*	*29*
35	*15*	*30*
40	*17*	*31*
45	*18*	*33*
50	***19***	***34***
55	*21*	*35*
60	*23*	*36*
65	*25*	*37*
70	*25*	*39*
75	***28***	***40***
80	*30*	*42*
85	*31*	*44*
90	*32*	*47*
95	*40*	*50*
99	*43*	*59*

Table (38) shows the proportions of the results of cardiorespiratory, which are the results for USA students higher than there counterpart from Libyan students. The percentiles for USA students are (25) the lowest percentile is 27, (50) the middle percentile is 34 and (75) the highest percentile is 40. Libyan student's percentiles are 12, 19 and 28 respectively.

Table (39). Percentile norms for Libyan and American students Age 11 for sit-up test (repetition) in muscular strength. N = 172

Percentile	*Sit up / repetition Age 11*	
	Libya	*USA*
5	*2*	*17*
10	*3*	*23*
15	*6*	*26*
20	*8*	*28*
25	***11***	***30***
30	*13*	*31*
35	*14*	*33*
40	*16*	*34*
45	*18*	*35*
50	***20***	***37***
55	*23*	*38*
60	*25*	*39*
65	*27*	*40*
70	*28*	*41*
75	***30***	***42***
80	*31*	*44*
85	*33*	*46*
90	*39*	*48*
95	*42*	*51*
99	*45*	*61*

Table (39) shows the proportions of the results of cardiorespiratory, which are the results for USA students higher than there counterpart from Libyan students . The percentiles for USA students are (25) the lowest percentile is 30, (50) the middle percentile is 37 and (75) the highest percentile is 42. Libyan students percentile are 11, 20 and 30 respectively .

Table (40). Percentile norms for Libyan and American students Age 10 for sit and reach test (cm) in flexibility. N = 139

Percentile	*Sit and reach / cm Age 10*	
	Libya	*USA*
5	*4*	*12*
10	*6*	*17*
15	*8*	*18*
20	*8*	*19*
25	***10***	***20***
30	*10*	*21*
35	*12*	*22*
40	*13*	*23*
45	*13*	*24*
50	***14***	***25***
55	*14*	*26*
60	*15*	*26*
65	*16*	*27*
70	*17*	*28*
75	***18***	***28***
80	*20*	*29*
85	*21*	*30*
90	*22*	*31*
95	*25*	*33*
99	*28*	*37*

Table (40) shows the proportions of the results of flexibility, which are the results for USA students higher than there counterpart from Libyan students. The percentiles for USA students are (25) the lowest percentile is 20, (50) the middle percentile is 25 and (75) the highest percentile is 28. Libyan student's percentiles are 10, 14 and 18 respectively.

Table (41). Percentile norms for Libyan and American students Age 11 for sit and reach test (cm) in flexibility. N = 172

Percentile	*Sit and reach / cm Age 11*	
	Libya	*USA*
5	*4*	*12*
10	*6*	*16*
15	*8*	*18*
20	*9*	*20*
25	***10***	***21***
30	*10*	*22*
35	*11*	*23*
40	*12*	*23*
45	*13*	*24*
50	***13***	***25***
55	*14*	*26*
60	*15*	*26*
65	*16*	*27*
70	*16*	*28*
75	***17***	***29***
80	*19*	*30*
85	*21*	*31*
90	*22*	*32*
95	*24*	*34*
99	*29*	*38*

Table (41) shows the proportions of the results of flexibility, which are the results for USA students higher than there counterpart from Libyan students . The percentiles for USA students are (25) the lowest percentile is 21, (50) the middle percentile is 25 and (75) the highest percentile is 29. Libyan students percentile are 10, 13 and 17 respectively.

Table (42). Percentile norms for Libyan and American students Age 10 for skinfold test (mm) in body composition. N = 139

Percentile	*Skinfold caliper / mm Age 10*	
	Libya	*USA*
5	*7*	*7*
10	*9*	*9*
15	*10*	*10*
20	*10*	*11*
25	***11***	***11***
30	*12*	*12*
35	*12*	*12*
40	*13*	*13*
45	*13*	*13*
50	***14***	***14***
55	*14*	*14*
60	*15*	*15*
65	*16*	*16*
70	*17*	*17*
75	***18***	***18***
80	*20*	*19*
85	*22*	*21*
90	*27*	*24*
95	*41*	*28*
99	*59*	*33*

Table (42) shows the proportions of the results of cardiorespiratory, which are the results for USA students similar to there counterpart from Libyan students . The percentiles for both students are (25) the lowest percentile is 11 (50) the middle percentile is 14 and (75) the highest percentile is 18.

Table (43). Percentile norms for Libyan and American students Age 11 for skinfold test (mm) in body composition.

N = 172

Percentile	*Skinfold caliper / mm Age 11*	
	Libya	*USA*
5	*8*	*8*
10	*10*	*9*
15	*10*	*10*
20	*11*	*11*
25	***12***	***12***
30	*12*	*12*
35	*13*	*12*
40	*14*	*13*
45	*14*	*14*
50	***14***	***15***
55	*15*	*16*
60	*16*	*16*
65	*17*	*17*
70	*20*	*19*
75	***21***	***20***
80	*24*	*22*
85	*30*	*24*
90	*32*	*28*
95	*42*	*33*
99	*54*	*38*

Table (43) shows the proportions of the results of cardiorespiratory, which are the results for USA students higher than there counterpart from Libyan students except lowest percentile is similar. The percentiles for USA students are (25) the lowest percentile is 12, (50) the middle percentile is 15 and (75) the highest percentile is 20. Libyan students percentile are 12, 14 and 21 respectively.

Results summary

This study analyzed the elements of physical fitness related to health. The study tests determined the fitness level of the participants. Also, compare the participant with their counter part from US. According to the obtained results within the limits of the research subject in addition to the measurements and the tests that have been done, and in view of statistical analysis of data related to the values of the variables in this study, it was noticed that physical activity is

extremely important to improve fitness and for staying healthy, also to reduce and prevent the risks of diseases such as chronic diseases like cancer, heart diseases and so on.

Chapter 5: Discussion

5.1 Part 1: Discussion of comparative results for the groups.

Health-related fitness is the main focus of our comparative study. Health-Related Fitness (HRF) is an essential element for each and every individual and thus we decided to carry out a pilot study for this purpose. Luckily enough, fitness testing is being introduced in Primary schools. One has to note that health-related fitness is now being further promoted with the inclusion of HRF in the Physical Education Programs. This should induce among children the importance of the issue of health awareness which will provide them with the right approach towards an active lifestyle. *(*Jackson et al, 2004)

It is generally presumed that regular physical activity is essential to support the normal growth and maturation, health, and fitness of children and adolescents. Fairly recently, an expert panel was formed to review the effects of physical activity on health and behavior in school-aged children and adolescents ages 6 to 18 years. The panel was also charged with making a recommendation for physical activity for children and adolescents. (Suitor & Vivica, 2007). (p. 95, 96)

According to the obtained results within the limits of the research subject in addition to the measurements and the tests that have been done, and in view of statistical analysis of data related to the values of the variables in this study, it was noticed that physical activity is extremely important to improve our fitness and for staying healthy also to reduce and prevent the risks of diseases such as chronic diseases like cancer, heart diseases and so on.

In reference to the tables from 20 to 33 which were described in the presentation of the study results, it appeared that the researcher was successful in achieving the main objectives of the study. A standard set levels of local health-related fitness for Libyan students in three districts which are Aljmeel, Regthaleen and Zwara, using a set of AAHPERD (American Association of Health and Physical Education, Recreation and Dance) battery. The results were analyzed using simple data description and analysis of variance. The ($p \leq 0.05$) level was used to determine significant differences between the three districts as referred to above.

From table 20 it is observed that there were no significant differences of the factors age, city and city*age in terms of affecting cardiorespiratory endurance (p≥0.05), (0.962), (0.876), (0.593), respectively. As for muscular strength shown in the table 21 referred to insignificant differences in terms of factors age, city*age and how they affected muscular strength, (p≥0.05), (0,385), (0,538), respectively. However, there was significant differences relate to the factor city and how it affected muscular strength (p≤0.05), (0.009) for which the mean value was (17.77±10.006) in favor to Zwara district as shown in the table 22. Table 23 showed that there were no significant differences a regards to factors age, city and city*age which affected flexibility (p≥0.05), (0.709), (0.491), (0.829), respectively. It follows from tables 24, 25 that there were no significant differences of factors age, city*age which affected skinfold (p≥0.05), (0.15) and (0.79) whose means were (19.44±11.059) and (17.45±10.238), respectively. On the other hand, there was significant differences of factor city and how it affected skinfold (p≤0.05) for which the mean vale was (0.05), (16.12±8.568) in favor of Zwara.

By regression it observed from tables 26 to 33 that there is an affect of height and weight in the components of physical fitness related health (cardiorespiratory endurance, muscular strength, flexibility and skinfold). In table 26 the affect of weight was significantly different which is (0.001), ($p < 0.01$). Regression of height and weight in cardiorespiratory endurance were observed in table 27. If the height increases by 1cm, the cardiorespiratory endurance will decrease to (0.011). If the weight increases by 1kg the cardiorespiratory endurance will increase to (0.037). In reference to the table 28 the affect of weight was significantly different which is (0.001), ($p < 0.01$). Regression of height and weight in terms of muscular strength were observed in table 29**.** If the height increases by 1cm, the strength will increase to (0.10). Whereas if the weight increase by 1kg, the strength will decrease to (0.23). According to the table **30** the affect of weight was significantly different which (0.001) is, ($p < 0.01$). Regression of height and weight as regards to flexibility were observed in table 31 indicating that if the height increases by 1cm, the flexibility will decrease to (0.02). While if the weight increases by 1kg, the flexibility will decrease to (0.07). According to results shown in table 32 it was noticed that the affect of height and weight were significantly different which are (age=0.009, height=0.001, weight=0.001) ($p < 0.05$) and the regression of height and weight in skinfold were observed in table 33. It was further observed that if the height increases by 1cm the skinfold, will decrease by (0.31), while if the weight increases by 1kg, the skinfold will increase by (0.56).

According to data analysis, it was observed that the researcher has reached the following results: From tables model (1) 22 to 27 appeared that there were no significant differences between the three districts (Aljmeel, Regthaleen and Zwara) in cardiorespiratory endurance and flexibility as shown in tables 22, 25 which refer to parity of the three districts. The researcher finds that the reason for the lack of statistically significant differences between groups in cardiorespiratory endurance are due to the convergence of students in terms of age where they represent pupils on the 10-11 years age group. In addition to that, students in these age groups are exposed to the same educational program at school which indicates a lack of interest in sporting activities. But there was significant differences in terms of the city factor which affected muscular strength ($p \leq 0.05$), (0.009) as shown in table 23 for which the mean value was (17.77 ± 10.006) and skinfold indicated in table 26, ($p \leq 0.05$), (0.05) whose mean value was (16.12 ± 8.568) in favor of Zwara district. The reason is the participation in different physical activities at school, and abundance of possibilities and equipments. On the other hand, Zwara more developed areas in the field of sports compared to Aljmeel and Regthaleen. It has shown more interest in different physical activities and sport in schools than Aljmeel or Regthaleen. Ontario (2006) showed that resources provided or recommended for schools should specify the amount and kind of equipment required for such activities. (p.23)

Physical activity equipment encourages children to particularly play and become involved in physical activity. According to the National Heart Foundation of Australia 2008 “physical activity should be fun!” making it fun encourages children to participate”. Using physical activity equipment also enables physical activity to become more flexible and mobile, equipment can be used on site or taken away for use at the participant’s convenience. (Department of health, 2011)

5.2 Part 2: Discussion of regression analysis of height and weight.

From tables model (2) 28 to 35, it was observed that if the height increases by 1cm, the cardiorespiratory endurance will decrease by 0.011, while if the weight increase by 1kg the cardiorespiratory endurance will increase by 0.037 in table 28, 29. In the table 30, 31 it noticed if the height increase by 1cm the strength will increase by 0.10, while if the weight increase by 1kg the strength will decrease by 0.23. As for table 32, 33 appeared that if the height increase by 1cm the flexibility will decrease by (0.02), while if the weight increase by 1kg the flexibility will decrease 0.07. Finally, referring to table 34, 35 it observed that if the height increase by 1cm

the skinfold will decrease by 0.31, while if the weight increase by 1kg the skinfold will increase by 0.56.

5.3 Part 3: Discussion of comparative results for Libya and US students.

The levels of these standards in the percentiles tables, officials can in the field of physical education at the level of basic education depends on them to evaluating students in health-related fitness through putting degrees for them to express their level of fitness related to health, and to modified and develop physical fitness related health programs even we can catch up the level of physical fitness related health of children from other country, which many scientists considers that are most important requirements of this age group, so, that it can make comparisons as mentioned in the tables 36 to 43 that allude to comparison the percentile of Libyan students with the counterpart from US.

Table 36 shows the percentiles degree for children, Libya and US in cardiorespiratory endurance element for pupils aged 10. Results for US students are higher than their counterpart from Libya, the percentiles for US students are (25) lowest percentile 7.57, (50) middle percentile 9.03, (75) highest percentile 10.38. Libyan students' percentiles are 9.58, 11.25 and 12.2 respectively. Table 37 refers to the percentiles degree for both Libyan and American children in cardiorespiratory endurance element aged 11. Results for US students are higher than their Libyan counterpart. The percentile for US students (25) lowest percentile 7.48, (50) middle percentile 8.56 and (75) highest percentile 10.40. Libyan students' percentiles are 9.51, 11.13 and 11.7 respectively. Table 38 shows the percentiles degree for both Libyan and American children in muscular strength element for pupils aged 10. The percentile for US students (25) lowest percentile 27, (50) middle percentile 34 and (75) highest percentile 40. Libyan students' percentiles are 12, 19 and 28 respectively. Also, table 39 shows the percentile degree for both Libyan and US children in muscular strength element for age 11. Results for US students are higher than their Libyan counterpart from Libya. The percentile for US students (25) lowest percentile 30, (50) middle percentile 37 and (75) highest percentile 42. Libyan students' percentiles are 11, 20 and 30 respectively. The table 40 refers to the percentiles degree for both Libyan and US children in flexibility element age 10. Results for US students are higher than their counterpart from Libya. The percentile for US students (25) lowest percentile 20, (50) middle percentile 25. (75) highest percentile 28. Libyan students percentiles are 10, 14 and 18 respectively. From table 41 it observes the percentiles degree for children, Libya and US in flexibility element age 11. The percentiles for US students are (25) the lowest percentile is 21.

(50) middle percentile 25, (75) highest percentile 29, Libyan students percentiles are 10, 13 and 17 respectively. In reference to table 42 it observes the percentiles degree for children, Libya and US in skinfold element age 10. The results for US students similar to their counterpart from Libyan students. The percentiles for both students are (25) is the lowest percentile 11. (50) The middle percentile is 14. (75) The highest percentile is 18. Finally, table 43 appears the percentiles degree for children, Libya and US in skinfold element age 11. Both results for US and Libyan students were similar in the lowest percentile. US were higher than Libyan students in middle percentile. As for the highest percentile Libyan students were higher than US students. The percentiles for US students are (25) lowest percentile 12, (50) middle percentile 15, (75) highest percentile 20. Libyan students percentile are 12, 14 and 21 respectively.

A comparison between Libyan and US students is shown in tables 36 to 43 it was observed that the US students' results are better than those of Libyan students which are an indication of the level of education, equipments and sport culture of this country. Using physical activity equipment also enables physical activity to become more flexible and mobile. Equipment can be used on site or taken away for use at the participant's convenience.

(Department of health, 2011)

Malina et, al (2004) study showed that the estimate of the number of participants in the US for the mid-1990s suggests that approximately 22 million youth 5 to 17 years of age participate in sport programs sponsored by community organizations, such as Kiwanis, Police Athletic League, American Youth Soccer Organizations, Little League Baseball and Pop Warner Football. Expressed as percentages of the United States population 5 to 17 years of age in 1995 (about 48.4), 45%, 5%, 30% and 0.1% participate in agency, club, recreation and intramural sports, respectively. (p.624)

That means, there are differences of statistical indications between the levels of Libyan students of elementary education and their counterparts from the USA in the elements of cardiorespiratory endurance, muscular strength and flexibility in favor to American students, and there are no differences of statistical indications in skinfold.

5.4 Limitations of the study

Some tests introduced in this study could be refined. This will be the subject of later studies. Sometimes the results were not credible or incorrect as a result of the validity of equipment and deficiency of the researcher and the assistants. Also, the researcher sometimes found that random sampling doesn't work and is inappropriate to the research study. Lack of motivation makes students' performance of the test weaker. The small sample from one area of the country means that the results may in fact not be a very accurate representation of all the students in the country. Study findings are applicable only to the subjects included in this study. The performance of the subjects might affect because of their physical lifestyle and the physical activity level. The performance of the subjects might affect due to their different physical characteristics.

Chapter 6: Conclusion

According to the obtained results within the limits of the research subject in addition to the measurements and the tests that have been done, and according to statistical analysis of data related to the values of the variables in this study, the researcher had been derives that is a differences significance in some elements of health related physical fitness, and non differences significant on others in favor Zwara city. On the other hand, most of the results or the values were equal. Also, it noticed that is a completely different between Libyan students and their counterpart from US in components of health related physical fitness in favor to US, that refer to the differences between developed country and less developed country. Indeed, by this study noticed that the level of health related physical fitness in Libya comparison with the developed country is very low. According to the study, the researcher noticed that Physical education is a necessity for the health and well-being of every student. As a unique and essential part of the total education program, physical education can significantly enhance all aspects of development including health, physical fitness, movement knowledge, academic performance, goal setting, self-esteem, and social skills. Evidence continues to mount that regular physical activity can prevent and manage coronary heart disease, which is the leading cause of death. Researches finding clearly demonstrate that daily exercise, from early childhood throughout life, is a primary factor in maintaining health and enriching that quality of life. People begin to acquire and establish patterns of health-related behavior during childhood and adolescence. Schools are an efficient vehicle for providing this physical education instruction. Finally, culture of the society, possibilities and equipments play an important role in making children engage in different physical activity.

6.1 Deductions

1. It is possible to introduce standards to illustrate the strengths and weaknesses in the components of health-related physical fitness for students in basic education aged (10-11 years old) withn the region of Alniqat Alkhams.
2. It was noticed that there are differences in the level of some health related physical fitness elements for some cities, and that there are no differences in the level of some health related physical fitness for the other cities.

3. By comparing the level of physical fitness related health for Libyan students of the same age in the United States of America, it was observed that there are differences in all components of health related physical fitness in favor of the US.
4. Low level of libyan students in each health related physical fitness elements.

6.2 Recommendation

To be instructed by the present research results that the researcher reached in the limits of the subject, the method used and the styles of the statistical treatment, the researcher suggests some recommendations as follows:

1. Utilization of standard levels concluded by the study as a tool for evaluating physical fitness related to health of elementary and primary schools (the 2nd segment) within Alniqat Alkhams region as well as classification of students according to their level and the introduction of appropriate developmental programs.

2. Paying due attention and care to the introduction of new and regular standards for pupils aged 12-15 years old in order to for such standards to suit any expected change in physical fitness associated with the health of elementary and primary pupils (the 2^{nd} segment).

3. Paying due attention to raising regular breathing endurance and muscular strength levels.

4. Paying due attention to the subject matter by conducting constant comparisons between levels of physical fitness associated with the health of associated with the health of elementary and primary pupils (2^{nd} segment) and their peers in other parts of the world in order to be able to always identify physical fitness associated with health of our children when compared with their peers in other countries.

5. Endeavour to raise physical fitness performance level associated with the health of elementary and primary pupils (2^{nd} segment).

6. Making use of tables of standards to Paying due attention concluded by the researcher in setting a school mark for physical education lesson similar to other academic subjects and presenting this mark to pupils so that each of them can identify his level in order to induce their interest for improving their level of achievement in this subject.

7. Paying due attention to the introduction of standards such as the study of different classroom pupils especially the selection of tests that are characterized by simplicity and lack of complexity.

8. Paying due attention to physical education lessons and programs in order to raise the level of physical fitness.

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Chapter 8: Appendices

8.1: Sit up test

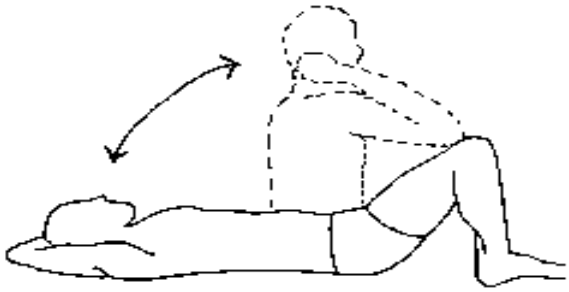
8.2: Skinfold caliper

8.3: Sit and reach

8.4: 1 mile run

8.1 Sit up test

Figure 1: Sit up test



Factor: Trunk strength (abdominal muscular endurance)

Description of test: Maximum number of sit-ups achievable in minute.

Material:

- 2 mats (set lengthwise next to each other)
- Stopwatch.
- Assistant.

Instruction for the subject:

Sit down on the floor, back upright, hands clasped behind your neck, knees bent at 90 degrees heels and feet flat on the mat. Then lie down on your back, shoulders touching the mat, and return to the sitting position with your elbows out in front so that they touch your knees. Keep your hands clasped behind your neck the whole time. When I say "Ready …start'' repeat this action as rapidly as possible. Continue until I say "stop". You do this test once.

Directives for the test leader:

- Kneel at the side of the subject, checking the correct starting position.

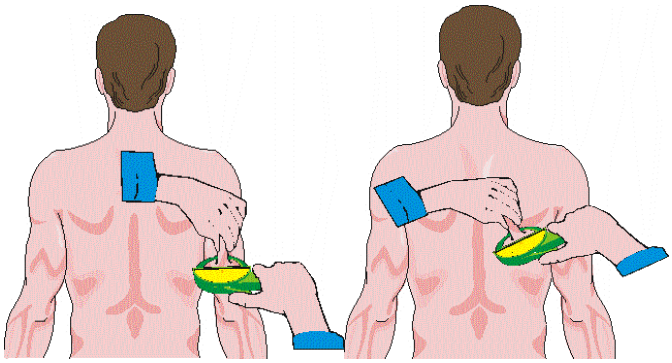
- Sit facing the subject with legs apart, things over the subject's feet to keep them on the ground. Put your hands in the bends of the subject's knees, thus maintaining a right angle (90) and the legs still.
- After giving the instructions and before the test begins, the subject executes the entire movement once, to make sure that he has understood.
- Start the stopwatch at the signal "Ready……start".
- Count aloud each time a complete, correct sit-up is performed. One complete sit-up goes from the sitting position, to the mat and back to the sitting position, elbows touching the knees.
- Count when the elbows touch the knees. No count means that the sit-up was not performed correctly.
- During the performance correct the subject if he does not touch the mat with his shoulders or his knees with his elbows when returning to the starting position.

Score:

The total number of correctly performed complete sit-up is the score.

8.2 Skin fold caliper

Figure 2 : Skinfold test

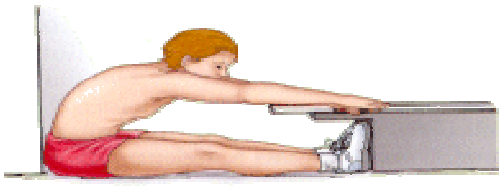


Procedure: Estimation of body fat by skinfold thickness measurement. Measurement can use from 3 to 9 different standard anatomical sites around the body. The right side is usually only measured (for consistency). The tester pinches the skin at the appropriate site to raise a double layer of skin and the underlying adipose tissue, but not the muscle. The calipers are then applied 1 cm below and at right angles to the pinch, and a reading in millimeters (mm) taken two seconds later. The mean of two measurements should be taken. If the two measurements differ greatly, a third should then be done, then the median value taken.

Measurement sites: There are many sites at which the skinfold pinch can be taken. The following are the most common. It is important to find the correct location to take the skinfold pinch, and anatomical terms are used to describe the landmarks. On many of these descriptions I have added lay terms (in brackets) that may help the non-medically trained users to find the correct sites for taking the skinfold measurements. The caliper is applied 1cm below and at right angles to the pinch. (Topendsports)

8.3 Sit and reach

Figure 3: Sit and reach test



The sit and reach test is a common measure of flexibility, and specifically measures the flexibility of the lower back and hamstring muscles. This test is important as because tightness in this area is implicated in lumbar lordosis, forward pelvic tilt and lower back pain. This test was first described by Wells and Dillon (1952) and is now widely used as a general test of flexibility.

Equipment required: sit and reach box (or alternatively a ruler can be used, and a step or box)

Procedure: This test involves sitting on the floor with legs stretched out straight ahead. Shoes should be removed. The soles of the feet are placed flat against the box. Both knees should be locked and pressed flat to the floor - the tester may assist by holding them down. With the palms facing downwards, and the hands on top of each other or side by side, the subject reaches forward along the measuring line as far as possible. Ensure that the hands remain at the same level, not one reaching further forward than the other. After some practice reaches, the subject reaches out and holds that position for at one-two seconds while the distance is recorded. Make sure there are no jerky movements.

Scoring: The score is recorded to the nearest centimeter or half inch as the distance reached by the hand. (Topendsports)

8.4 One mile run

Figure 4 : One mile run

This test measured cardiorespiratory endurance. The object is to run 1 mile (1.6 kilometers) in as short time as possible. Walking is permitted if students cannot run the entire distance. Firstly, students warm up before taking the test. Secondly, Students begin on the signal “Ready, Start.” As they cross the finish line, elapsed time should be called to the participants, and the students begin running at their own pace. Students should cool down by continuing to walk for several minutes after completing the test. The total time to complete the course is recorded for each participant, in minutes and seconds. To achieve the best result for this test, adequate practice and good pacing is required, and performance on this test can be affected greatly by motivation. Advantage of this test is large groups of students can be tested at once, and it is a very cheap and simple test to perform. If the test is conducted on a 400m running track, all the athletes will be in view throughout the test. (Dorothy et al, 2003)