

UTILIZATION TRENDS OF DIETARY SUPPLEMENTS BY MALE RUGBY  
PLAYERS IN THE 2006 SEASON OF KENYA CUP LEAGUE

BY

ELIZABETH MSE

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Mse, Elizabeth  
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**DECLARATION**

I declare that this thesis is my original work and has not been presented for a degree in any other university or any other award.

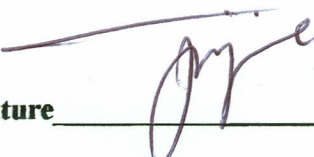
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Date 23/06/08

Elizabeth Mse  
I56/11200/04

**Supervisor's Approval**

This thesis has been submitted for examination with our approval as University supervisors

Signature 

Date 24/6/08

Judith Kimiywe, PhD  
Department of Foods, Nutrition and Dietetics  
Kenya University

Signature 

Date 20<sup>th</sup> June 2008

Njororai W.W. Simiyu, PhD  
Department of Physical Education  
Wiley College, Texas, USA

## **DEDICATION**

To my parents, the late Japheth Kiliswa Walubengo, Mary Grace Nasimiyu, Richard Nangaka, Lorna Anjema Nangila, my late Sisters Jenipher Nakhumicha and Catherine Nakoba

Finally to my husband Godfrey and children Ken, Eve and Keith for their immense support.

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## LIST OF ABBREVIATIONS

ATP	-	Adenosine Triphosphate
BM	-	Body Mass
CD	-	Creatine Phosphate
Cr <sub>m</sub>	-	Creatine Monohydrate
EE	-	Energy Expenditure
EI	-	Estimated Energy Intake
ES	-	Eleutherococcus Sentico Sus
ES	-	Effects Sizes
GI	-	Glycaemic Indix
HB	-	Haemoglobin
HGLu	-	Maltose
Keal	-	Kilo Calories
Mamix	-	Sucruse, Maltose
MOE	-	Ministry of Education
PCr	-	Phosphor Creatine
PCV	-	Packed Cell Volume
Plac	-	Placebo
RBC	-	Red Blood Cells
RDA	-	Recommended Dietary Allowances
RDI	-	Recommended Dietary Intake
R.T.W.	-	Relative Total Work

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## ABSTRACT

Dietary or nutritional supplements are substances which act either nutritionally to reverse or prevent deficiency (multivitamins) or pharmacological to alter some process. This takes place through affecting the energy metabolism, affecting the central nervous system, increasing lean body mass or muscle mass, stimulating protein synthesis and reducing body fat content. Nutritional supplements are sometimes referred to as ergogenic aids since they are believed to enhance performance. A considerable number of elite, non-elite and recreational athletes have been reported having used a wide range of special foods and supplements. In spite of this, it is not yet established whether rugby players in Kenya utilize dietary (nutritional) supplements or not. The purpose of the present study was to establish demographic characteristics, determine the extent of the knowledge, to determine the consumption levels and identify factors that influence the utilization trends of dietary supplements by the Kenya Cup Rugby players of the 2006 season. The study adopted the descriptive survey design. This enabled the researcher to cover an extensive area and obtain as much information as possible. The factors under investigation were age, level of education, occupation, experience and club affiliation as independent variables while knowledge and consumption of supplements as well as reasons for taking supplements as dependant variables. The target population was 210 players from seven teams that participated in the Kenya Cup League. Simple random sampling was used to select 140 (67%) respondents out of the target population of 210. A validated questionnaire based on a five-point Likert scale was used to collect data. Descriptive statistics were used to describe players' demographic characteristics and their knowledge levels. Chi-square ( $\chi^2$ ) at 0.05 level of significance was used to test the hypotheses. Results showed that majority (78%) of the players were below the age of 25 years. The largest (65%) proportion of the players had attained tertiary/university level of education. Half (50%) of the players had been with their respective teams for a period of 3 – 6 years. The largest (71.1%) proportion of the players had played for the national team a duration of less than 2 years. Generally, rugby players had relatively little (creatine monohydrate – 44.9%, antioxidants – 11.3%, multivitamins 44.2%, glutamine 14%, whey protein 37.3% and ZMA – 8.6%) knowledge about the dietary supplements. The results showed significant differences in the consumption of dietary supplements based on age, level of education, occupation, experience and club affiliation. All the six factors (taking, enjoying, not wanting to take, liking and not motivated to take dietary supplements) showed significant differences at 0.000. Similarly significant differences were also noted in the reasons for taking dietary supplements based on age, level of education, occupation, experience and club affiliation. Four reasons (excel in sport, not important and cannot afford a balanced diet) were found to influence rugby players at 0.000 except worthwhile and necessary at 0.001. Based on the findings, the following recommendations were suggested; the Kenya Rugby Football Union should organise clinics, courses, and seminars for rugby coaches and teachers regarding dietary supplementation, the technical benches of rugby clubs should incorporate nutritionists (dieticians) to guide players on the right dietary habits. Further research should be conducted on women rugby teams, other dietary supplements and variables apart from those investigated in the present study.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background to the Problem

Rugby football originated in 1823 AD and was attributed to William Webb who died in 1872. It was mainly played by great public schools of England (Myles and Thomas, 1994). In Kenya, club rugby dates back to 1923 with the formation of Nondescripts and Old Harlequins club. This was followed by Impala (1930), Mean Machine (1976), Black Blad (1978), Barclays Bank and Watembezi (1981) Nakuru and Damu Pevu (1986). National rugby tournaments included Enterprise Cup (1930), Kenya Cup (1960), Eric Shirley Shield, Mwamba Cup, Black Rock Festival (played over Easter) and the seven aside competition series. Currently, the top rugby teams taking part in the Kenya Cup league are Kenya Commercial Bank, Nondescripts, Harlequins, Impala, Mwamba, Harlequins, Mean Machine and Nakuru (Kiganjo *et al.*, 2003). Basically, the ball is both handled and kicked.

The main objective of the game of rugby is to place a ball on the ground across the goalline in order to make a try. A given team usually strives to gain possession of the ball through contests such as line outs, scrums, mauls, kick off and open play situations (Biscombe and Duwett, 1998; Kiganjo *et al.*, 2003). All these require strength, endurance, power and speed. Currently, rugby has become a multimillion-dollar sport that places extreme physical demands on its players. Today, rugby players compete for fame and glory in the Rugby Union or Rugby League. Players smash and tackle opponents to stop them from getting a try. Therefore, if one is to perform well, he has to be aggressive and

determined. This is only possible when rugby players eat a balanced diet and use nutritional or dietary supplements (Steven, 2002).

Nutritional or dietary supplements are ergogenic aids aimed at enhancing performance either by affecting energy metabolism or by affecting on the central nervous system at increasing lean body mass or muscle mass, by stimulation of protein synthesis or at reducing body fat content (Maughan, 2005). Similarly, Laurie (1999) notes that dietary supplements are any substances which act either nutritionally to reverse or prevent deficiencies (e.g. Multivitamins). They are the most recognized form of ergogenic aids (Burke Desbrou and Minehan, 2000). A survey in 1998 by The Independent British national newspaper) on 360 elite athletes showed 44% were using supplements regularly which included 100% of rugby league players and 100% weight lifters (Poortmans and Francauz (2000). Whey protein, antioxidants, creatine monohydrate, multivitamins, glutamine and ZMA (a combination of zinc, magnesium, and asparate] are supplements which are mostly used by rugby players (Adams, 2005).

## **1.2 Statement of the Problem**

The use of dietary or nutritional supplements in sport is widespread. They are ergogenic aids aimed at enhancing performance above that expected, increasing lean body mass or muscle mass, and stimulating protein synthesis (Maughan, 2005). The game of rugby usually places extreme physical demands on its players and if one has to perform well, he has to be aggressive and determined. Each player has to strive to gain possession of the ball through contests such as line outs, mauls, kick off and even open-play situations

(Biscombe, 1998). All these require strength, endurance, speed and power. Therefore, if a rugby team wants to perform well, it has to be able to tackle opponents, very fast indeed.

Therefore to withstand this kind of pressure, the players have to go all out during hard training. This is impossible without a balanced diet and using the best nutritional supplements. The supplements help to maximize one's natural athletic abilities and to take the game to the next level (Steven, 2002; Myles and Thomas, 1994). Yet, it is not known whether Kenya rugby players take dietary supplements or not. That is why the research was set to establish utilization trends of dietary supplements among the rugby players. The variables investigated were age, level of education, occupation, experience and club affiliation.

### **1.3 The Purpose of the Study**

The purpose of the study was to establish the knowledge or awareness and utilization trends of dietary supplements by Kenya cup rugby players based on their age, level of education, occupation, experience and club affiliation.

### **1.4 Objectives of the Study**

The objectives of the study were:

- i) To establish the demographic characteristics of the Kenyan cup rugby players.
- ii) To determine the extent of knowledge of the Kenyan cup rugby players on the existing dietary supplements.
- iii) To determine if Kenyan cup rugby players consume dietary supplements.

iv) To identify factors that influence the utilization of dietary supplements by Kenya cup rugby players.

## 1.5 Hypotheses

**H<sub>01</sub>** There would be no significant difference in the consumption of dietary supplements by the Kenya cup rugby players on the basis of their:

- (i) age
- (ii) academic qualifications
- (iii) occupation
- (iv) experience
- (v) club affiliation.

**H<sub>02</sub>** There would be no significant difference in the reasons for taking dietary supplements by Kenya cup rugby players on the basis of their:

- (i) age
- (ii) academic qualifications
- (iii) occupation
- (iv) experience
- (v) club affiliation.

## 1.6 Conceptual Framework

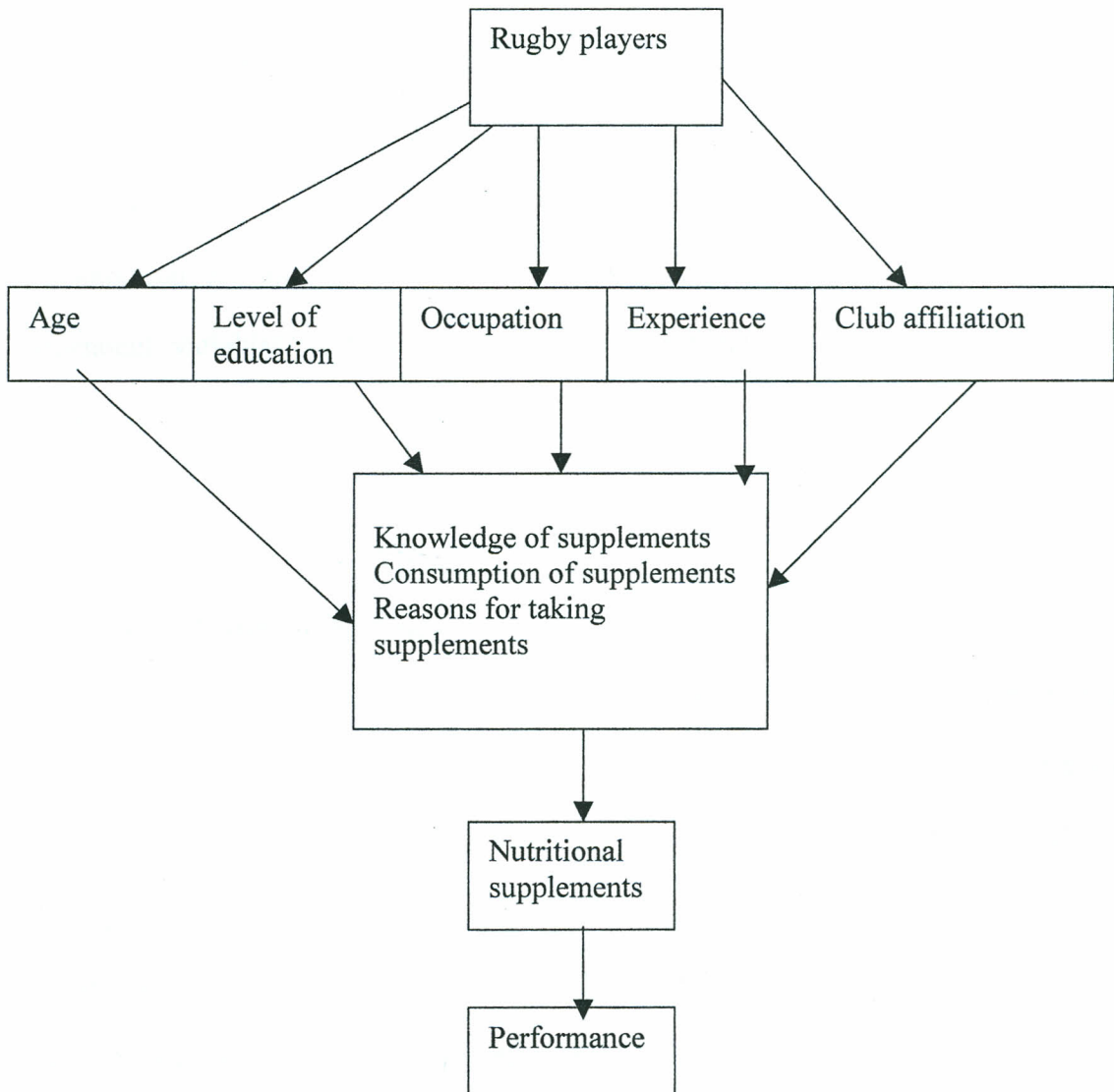
Numerous ergogenic aids that are considered to enhance performance are used by amateur and professional players. The most recognized form of ergogenic aids are dietary

supplements. Approximately 50% of the general population have been reported taking some form of dietary supplement while 76 to 100% of athletes in some sports are reported to use them (Dale, 2001). Other studies have also shown that significant numbers of both young and old people who engage in hard vigorous athletics training use dietary supplements. (US Food and Nutrition Board, 1989; Food and Agricultural Organization; 1985).

The level of education influences the use of dietary supplements by rugby players. This is supported by Nayge and Reed (1999) among others who have revealed that there is greater use of supplements among adults whose level of education or socio-economic status is higher. Further to this, Frank *et al* (2000) notes that more years of education imply greater awareness of the role of nutrition for good health. Indeed, there is a wide range of products or dietary supplements available in the market (Dale, 2001). In order to maintain a consistent supply of the dietary supplements, one needs to have enough money. This is supported by Myles and Thomas (1994) whose study showed that rugby players can only perform well if they eat a well balanced diet and use the best supplements that money can buy. Janet *et al.* (2002) also concluded that rugby participants whose lifestyles are healthier tend to use dietary supplements.

In order for rugby players to play for their teams for a longer period of time, they are expected to perform well. This is espoused by Slesinki *et al.*, (1995) who revealed that engaging in regular physical activity is positively associated with dietary supplement use. In addition, Brilla and Conte (1999), also noted that Zinc, Magnesium and Aspartate

(ZMA) was widely used by strength-training athletes such as footballers, body builders,, sprinters and rugby players. Indeed, Figure 1.1 summarizes the variables that are associated with the utilization of dietary supplements.



**Figure 1.1: Variables Associated with Utilization of Dietary Supplements Constructed by the Researcher Based on US Food & Nutritional Board (1989), Frank *et al.*, (2000), Janet *et al.* (2002) and Slesinki *et al* (1996)**

According to Maughan (2005), supplements are ergogenic aids aimed primarily at enhancing performance either by affecting energy metabolism or by an effect on the central nervous system, at increasing lean body mass or muscle mass, by stimulating protein synthesis or at reducing body fat. Figure 1.1 shows the various factors associated with the use of dietary supplements among rugby players i.e. age, level of education, occupation, experience and club affiliation. While knowledge of dietary supplements, consumption of supplements and, reasons why players take the supplements were dependent variables. Both independent and dependent variables were intended to establish the type of nutritional supplements taken by rugby players to enhance their performances.

### **1.7 Significance of the Study**

The findings of this study will provide information on the use of dietary supplements by Kenya cup rugby players that will be useful to the respective stakeholders of Kenyan rugby who formulate policies regarding dietary supplements for the sport in general. The findings will assist coaches to design training programmes which would otherwise enhance or improve the physical fitness levels of rugby players by developing endurance strength, flexibility (mobility) speed, balance, co-ordination and reaction time. The information will also be used by rugby players to optimize nutrition and fluid intake in order to delay the onset of fatigue so as to enhance their performance (Levit,2001) Teachers and students who are interested in rugby will use the information to gain a

better understanding of nutritional supplements as well as their effects on health and sport performance.

### **1.8 Assumptions of the Study**

The study was carried out based on the assumptions that:-

1. Kenya Cup Rugby players had some knowledge of dietary supplements.
2. The Kenya Cup Rugby players were honest in their responses.

### **1.9 Delimitations of the Study**

The study was delimited to:-

- (i) The period between April - August 2006 during the Kenya cup season. This is the season within which Kenya cup rugby takes place.
- (ii) The players who participated in the Kenya cup league of 2006 season. These will be respondents during data collection.
- (iii) Variables of age, levels of education, occupation, experience and club affiliation. These are variables that will be investigated in the study.
- (iv) Dietary supplements in the form of creatine monohydrate, antioxidants, multivitamins, glutamine, whey protein and ZMA ( Zinc, Magnesium and Aspartate). According to Maughan (2005), these are the most popular supplements used by rugby players.

## 1.10 Limitations of the Study

The study was limited by the researcher's lack of control over the training sessions of the players. This compelled the researcher to visit the training venues severally before the players of the respective clubs assembled to respond to the questionnaire.

## 1.11 Operational Definition of Terms

- Age - Defined as chronological years of rugby players such as below 25 years, 25-30 years, 31 – 35 years and above 40 years
- Clubs - The teams that took part in the Kenya Cup Rugby League of 2006 season, including Mean Machine, Impala, Mwamba, United States International University, Kenya Commercial Bank, Harlequins and Nondescripts.
- Experience - Time spent by Kenya cup rugby players as they play for their teams which is expressed in years i.e the time less than 2 years, 3-6 years, 7-10 years, 11 – 14 years, and over 19 years.
- Kenya Cup League - The highest rugby league in Kenya recognized by Kenya Rugby Football Union.
- Level of Education - Standard of learning reached such as 'O', 'A' levels undergraduate and postgraduate qualifications at the tertiary/University levels.
- Occupation - Job or profession of rugby players that included being a student, teacher, accountant, administrator, self-employed, engineer, doctor and lawyer.
- Player - Rugby player who represents his team in Kenya Cup league.

- Supplements - Dietary supplements used by rugby players such as creatine monohydrate, multivitamins, glutamine, whey protein, antioxidants and ZMA (Zinc, Magnesium and Aspartate)
- 2006 season - A period ranging from April-August 2006 within which the Kenya Cup League was played.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.0 Introduction

This chapter covers literature related to the study. It focuses on the following areas; nutrition requirements, optimizing rugby performance with nutrition, strategies to optimise performance and accelerate recovery, factors influencing nutrient utilization during performance by players, use of supplements, related studies and a summary of the same.

#### 2.1 Nutrition Requirements for Rugby Players

Rugby is classified as an intermittent high-intensity sport involving a large number of intense efforts interspersed with rest intervals. Match play is a blend of periods of inactivity, low intensity, cruising and sprinting as well as rucking/mauling and scrummaging and other high intensity stationary work. The demands placed on the players during the match are obviously dependent on their position and role. Inside and outside backs cover greater total distance, between 5 – 8 km per match, with more walking, cruising, sprinting and utility work than the props, locks and back row forwards (Deutch *et al*, 1998).

According to Wagner (2005), the forwards spend more time engaging in high intensity static work but they less total distance, usually less than 5km per match. In this regard there should be optimal training regimes as well as local dietary requirements for players

because the intensity of play determines which muscle energy systems and fuel are used. During times of high – intensity training, adequate energy needs should be consumed to maintain body weight, maximize the training effects and maintain health. Low energy intakes can result in loss of muscle mass, failure to gain bone density and increased risk of fatigue and injury. The ideal mix of nutrients provided by the diet should optimize rugby performance. Unfortunately, there is very little published research on rugby and the effect of nutrition on rugby performance (Tipton *et al.* , 2001).

The oxidation of fuels (fats, carbohydrates and proteins) requires oxygen and releases energy that is used by the muscle for production of power and movement. Rugby training requires high levels of energy to perform (Wagner, 2005). The rate of energy release from the oxidative system is slow and therefore it is relied upon during low intensity work such as walking, jogging and cruising as well as during recovery from high intensity action. During prolonged activity, one of the main causes of fatigue is running out of carbohydrate fuel (stored as muscle glycogen). This is because carbohydrate is only stored in relatively limited quantities in the muscle and liver. Carbohydrate is a favoured fuel during moderate high exercise intensities, because the rate at which energy is released from carbohydrate oxidation is faster than from fat and amino acid oxidations. Therefore, this means that during prolonged or high intensity activity, muscle glycogen stores are used up rapidly (Tipton *et al.*, 2001).

On the other hand, lactic acid is produced from incomplete breakdown of carbohydrates (Glucose from the body and muscle glycogen). This rapidly releases energy for muscle

contraction. The lactic acid system is therefore, important during high intensity activity such as sprinting, ruck/mauling and scrummage. However, lactic acid causes a burning sensation after building up in the muscle. It causes fatigue partly due to acidity but also because the limited muscle glycogen store is depleted very quickly in this process, during the game of rugby. In view of this, high carbohydrate content in a player's diet before, during and after the match can help to counteract these effects. Therefore, about 2-3 days before – match, carbohydrate ingestion for rugby players should be 7 – 10 grams per kilogram body weight to maximize energy stores (American Dietetic Association: 2000). Additionally, phosphocreatine is a high energy substance that is stored in the muscle but in limited amounts. It can be broken down very quickly, thereby releasing energy that can be used in power muscle contraction and movement. However, stores are rapidly depleted. Phosphocreatine system is used during brief high intensity work [1-5 seconds] such as kicking, tackling and the acceleration phase of a sprint (American Dietetic Association:, 2000).

Apart from carbohydrates that provide energy, fat is also required. Rugby players need a healthy amount of fat in their diet. Too much fat is unnecessary as it hinders performance and too little body fat causes prolonged muscle soreness and increases injury (Wagner 2005). However, it should be noted that fat is a natural shock absorber that cushions the body from hard hits and tackles. Fats from nuts, dairy products and meats are ignored but must be taken in moderation and balanced out with energy expenditure. (ACSM, 1999). Protein intake needs to be relatively high in order to maintain muscle mass and aid recovery. Endurance athletes like rugby players require between 1.2 to 1.4 grams per

kilogram body weight per day (American Dietetic Association:, 2000). Rugby players also require vitamins and or minerals in order to aid recovery and maintain body's natural functions. Carrots, apples, bananas, broccoli and egg plants are among favourite fruits for rugby players (Wagner, 2005).

### **2.1.1 Optimizing Rugby Performance with Nutrition**

According to Ricardo *et al* (2003), energy balance is simple but a vital concept for body weight regulation. It is important to note that during the different phases of training and competitive periods, players will experience weight gain, weight loss and weight maintenance. If energy intake from the diet exceeds energy expenditure, the players will gain body weight whereas if intake is less than expenditure then the body weight will be lost. If energy intake matches energy expenditure, then body weight will remain constant. If fat mass is increasing, then energy intake should be reduced and energy expenditure (training load) increased. Therefore, the athlete who wants to optimize exercise performance needs to follow a balanced diet, hydration practice, use supplements or ergogenic acids carefully and minimize weight (Wagner, 2005; ADM, 2000)

### **2.1.2 Strategies to Optimize Performance and Accelerate Recovery**

#### **(a) Pre-Event Meal**

The main objective of pre-exercise meal is to ensure that the muscle and liver glycogen stores are full at the start of the match. Carbohydrate depletion is one of the main causes of fatigue in a rugby match play (Wagner 2005). Glucose is the main fuel for the brain and so, low blood glucose concentration could potentially impair mental performance and

decision – making ability which would reduce performance. Rugby players should avoid taking any carbohydrate 20 minutes before the match and drink plenty of water to sustain hydration levels. However, Levit (2001) says high glycemic index [ GI ] carbohydrate taken 10 minutes of the start of the match is recommended. Generally the diet should comprise foods that are familiar and well tolerated by the athlete. A meal containing 200 – 300g of moderate glycemic index carbohydrate should be eaten 3-4 hours before exercise. The meal should be easily digestible (since high fibre and high/fat meals slow the rate of digestion) to avoid stomach cramps during exercise. The cramps may result if there is still undigested food in the system. (Casa *et al*, 2000)

#### **(b) Event - Meal**

The primary goal during this phase is for nutrient consumption to replace fluid losses and provide carbohydrate drinks for maintenance of blood glucose levels (American Dietetic Association:, 2000). Performance is optimal when athletes maintain fluid balance. Dehydration increases the risk of potentially life threatening heat, injury or heat stroke. Therefore, consumption of carbohydrates enables athletes to exercise at a given intensity for a longer period of time and also to exercise at a higher intensity later. Most commercially available carbohydrate drinks are 6.5% solution. According to Maclean and Close (2000), a higher concentration of carbohydrate (>10%) slows the rate at which the glucose and fluid reaches the blood stream where it is of benefit. Therefore, the recommended regime is to consume 8 ml per kg body weight of 6% carbohydrate solution immediately before exercise (i.e. for a 90 kg person, 720 ml) and every 15 minutes to consume a further 2 ml per kg body weight (i.e. for a 90 kg person, 150m).

This ensures that fluid empties from the stomach and is absorbed rapidly (Maclean and Close, 2000).

**(c) Post- Event Nutrition**

The main dietary objective is to provide adequate energy and ensure rapid recovery. Despite players and coaches efforts in following an optimal pre-competition diet and consuming carbohydrate drinks during exercise, they will be both dehydrated and will have reduced carbohydrate stores. Therefore, it is essential that both the fluid and carbohydrate, be replaced rapidly in order to aid recovery. It is possible to restore the stores within 24 hours. According to Casa *et al* (2000), rugby players should consume 150% of the fluid volume lost in order to achieve the same hydration as before exercise. A weight loss of 1 kg means that the player has a fluid loss of 1 litre and therefore needs to drink 1.5 liter fluid to ensure adequate rehydration (Casa *et al.*, 2000).

If glycogen is depleted after an event, an intake of 1.5g per kg body weight of carbohydrate should be taken in the first 30 minutes and again after every 2 hours. Protein consumption provides amino acids for building and repair of muscle tissue. In summary, athletes should consume a mixed meal of carbohydrate, protein, fats and fruits soon after competition (A.D.A, 2000).

### **2.1.3 Factors Influencing Nutrient Utilization during Performance**

#### **(a) Environmental Conditions**

##### **(i) Hot and Humid Environments.**

The ambient temperature and wind speed have a major influence on the physical exchange of heat between the body and the environment. The risks of dehydration and heat injury increase dramatically in hot humid environments (ACSM, 1996). If the ambient temperature exceeds body or skin temperature, heat is gained from the environment by physical transfer, leaving evaporative loss as the only mechanism available to prevent or limit a rise in body temperature. The increased sweating rate in the heat will result in an increased requirement for fluid replacement (ACMS, 1998). Players should limit the extent of warm-up prior to competition and by reducing the amount of clothing which will help to reduce the sweat loss. For high ambient- temperatures, there is need to reduce the intensity if it has to be successful. If the competition does occur, then every precaution should be taken to hydrate athletes, have ample access to fluids and are monitored for heat related illness. On the other hand, when the humidity is high, vaporization of sweat does occur. In this case, exercise tolerance is likely to be limited by dehydration and hypothermia (Clarkson and Walinsky, 1998).

##### **(ii) Cold Environments**

Dehydration is not uncommon during cool temperature or weather (Adner *et. al*, 1988). Factors that contribute to dehydration under these conditions include respiratory fluid losses in cold dry environments, sweat losses that may be high if clothing is worn during intense exercise as well as low ingestion levels of fluids by athletes. There may also be

some advantage in reducing the carbohydrate content of drinks and increasing the sodium content (Freund and Sawka, 1996).

**(b) Altitude**

Exposure to altitudes higher than 2500m (8,300 ff) may result in fluid losses beyond those associated with any exercise that might be performed. These are as a result of high respiratory water losses, accompanied by decreased appetite, which leads to an increased fluid intake (Hackett *et al.*, 1981). Respiratory water losses may be as high as 1,900 ml per day in men and 830 ml in women. Thus, fluid intake at high altitude should be increased to as much as 3 to 4 liters per day to assume optimal kidney function (Mawson, *et al.*, 2000).

**(c) Diet**

Athletes should follow the recommendations for intakes of energy macronutrients (Carbohydrates, proteins and fat), vitamins and mineral. These must be translated into food choices consistent with food preferences and training schedules of athletes. An athlete's diet requires additional fluid to cover sweat losses and additional energy to fuel physical activity. Food and fluid intakes around workouts need to be determined on an individual basis and will depend in part on an athletes gastro-intestinal characteristics as well as the intensity of exercise. For instance, an athlete might tolerate a snack consisting of milk and sandwich 1 hour before a low-intensity workout but would be uncomfortable if the same meal was consumed before a very hard effort (A D A, 2000).

**(d). Exercise Intensity**

It has been known for several years from measurements, that as exercise intensity increases, there is increased reliance on carbohydrates (Lemom, 1991a). This is because the energy yield per liter of oxygen is greater from oxidation of carbohydrates than from fats. In addition, as exercise intensity reaches and exceeds maximal oxygen uptake, maximum glycogen utilization increases markedly and blood glucose utilization declines. This provides an energetic advantage since slight ATP is generated from the breakdown of glycogen compared with glucose. High intensity exercise leads to increased protein requirements when combined with exercise duration (Lemon, 1991a).

**(e) Exercise Duration**

Usually, there is an inverse relationship between exercise intensity and duration. According to Lemom, (1991a) as exercise increases there is increased reliance on carbohydrate. As exercise duration increases, there is a declining contribution from carbohydrates, related in part to the decreased levels of muscle glycogen and glucose, but also to the increased availability of plasma – free fatty acids. However, even during prolonged exercise, there is a reliance on carbohydrates to provide pyruvate for oxidation (Lemon 1991a). Lemom (1991a) has shown that during prolonged exercise, there is dramatic increase in blood urea (a waste product of protein utilization) concentration (approximately 60 – 70% vol. 2. Max) beginning about 60 -70 min. There is also increased protein utilization at this time because the increase was substantially greater (Lemon, 1991a).

## 2.2 Use of Supplements by Rugby Players

According to Wagner (2005), creatine monohydrate is the most popular dietary supplement used by rugby players. It provides extra kilograms in weight as well as promoting endurance and explosive power. Since rugby is a demanding sport, multivitamins replenish the body. Kayne (1999) emphasizes that creatine is the athlete's wonder supplement. He conducted a survey among 300 elite performers who responded to a questionnaire. Nearly 57 percent said they had taken creatine. Among rugby league players and weight lifters, creatine use was 100% (Poortman's and Framcaux 2000). Creatine supplementation seems to speed up the rate of recovery between sprints, presumably because the high energy fuel phosphocreatine is synthesized more quickly. Some people as a result of their high meat content in their diet already have high phosphocreatine levels and do not get additional benefit from creatine supplements. So, in a recent study in highly trained rugby players, a loading dose of creatine (5 days consuming 20g creatine per day) improves repeated sprint performance on cycle ergometer or repeated running sprints (Ahmum *et al.*, 2005).

Rugby players should consume between 1.6 – 1.7g protein per kg body weight per day in order to allow accumulation and maintenance of the tissue (Tarnopolsky *et al.*, 1999, Tarnopolsky *et al.*, 1991). However recent research by Tipton *et al* (2000) has shown that taking essential amino acid supplements, either before or immediately after exercise, will support increases in muscle mass. A dose of 6 – 20 g essential amino acids (Leucine, lysine, theomine, methiomine) is most effective. This reduces the rate at which muscle protein is broken down after exercise. It is best to consume essential amino acids with

carbohydrate to ensure that both protein and glycogen synthesis are maximized during recovery. To date, only one study by Tipton *et al* (2000) has examined the chronic effects of taking a protein supplement immediately after exercise. This was among two groups of elderly men who completed a 12 week resistance exercise programme. They received a protein supplement (10g protein, 7 g carbohydrate 3g fat) either immediately after or 2 hours after each training session. Results showed that muscle size increased for the immediate feeding group but not the delayed feeding groups. Dynamic strength increased for both groups. It appears therefore that chronic consumption of a protein supplement immediately after exercise will promote muscle mass and increase strength.

ZMA also known as zinc, magnesium and aspartate is actually a blend of zinc magnesium and vitamins B 6. ZMA boosts natural testosterone to near maximum levels (Brilla and Conte, 1999). Testosterone is a hormone responsible for regulating muscle growth. Zinc has been known for increasing the levels of growth hormone. Hard straining activities like playing the game of rugby can suppress testosterone levels. One research study shows 35.5% rise in testosterone following ZMA supplementation. Therefore a dose of the nutrients will raise low testosterone, increase strength and accelerate gains in muscle size (Brilla and Conte 1999).

Magnesium is an essential mineral involved in several chemical reactions in the body including the oxidation of fat (Lukaski *et al.* 1982). They further indicate that magnesium significantly lost through sweat and levels of zinc drop during a hard activity. In view of this, significant results have been recorded following supplementation. Magnesium

supplementation increased muscular performance quickly (Brilla & Haley; 1992). In addition after 14 days of zinc supplementation, subjects showed increases in muscular strength and endurance. It is important to note that ZMA increase the need for protein. Therefore, most of the athletes use it together with whey protein during the mass building phase of their training programmer. ZMA is used widely by endurance athletes such as runners, cyclists and triathletes, and strength training athletes like footballers, body builders, sprinters and rugby players (Brilla and Conte, 1999)

In another study by Rousseau *et al.* (2000) on well-trained athletes to investigate ‘high – exposure’ to sub-deficient antioxidant status, and consequently to oxidate damage in relation to estimated daily energy expenditure (EE) and dietary antioxidant intake. The results showed that caretonoids play a protective role as exogenous antioxidants and its intake should be considered carefully. As evidenced by analysis of variance (ANOVA), E.E – Induced Vitamin C intakes increased and consequently led to increased plasma ascorbic acid concentrations (Rousseou *et al.*, 2004).

Glutamine is the most abundant amino acid (protein building blood) in the body which is involved in more metabolic processes than any other amino acid. It is converted to glucose where more glucose is required by the body as an energy source. It serves as as fuel for cells lining the intestines. Without it, these cells waste away (Adams, 2005). Dale (2001) shows that glutamine is the largest fuel amino-acid for athletes and people under stress. New studies also show that glutamine is required for cellular replication in the immune system as well as important for muscle growth and homeostasis.

As far as multivitamins are concerned, Adams (2005) also recommends a whole food concentrates rather than isolated vitamins and minerals in powder form. The body requires complete vitamins from different sources (not just vitamin c). Multivitamins increase energy, endurance and aerobic capacity needed by athletes (Adams, 2005).

Table 2.2 presents a summary of some of the most popular dietary supplements used by rugby players to enhance performance as identified by Dale (2001), Flex (2002), and Adams (2005).

**Table 2.2 Popular Dietary Supplements used by Rugby Players to Enhance Performance**

Supplement	Source	Function	Dosage
Creatine monohydrate	Manufactured in the body during protein metabolism available as a supplements and is present mostly in meat and fish	<ol style="list-style-type: none"> <li>1. As energy source for increased strength and power.</li> <li>2. Increase in muscle mass and</li> <li>3. Ability for high intensity training</li> </ol>	5g per day
Antioxidants (vitamins C & E)	Liver, eggs dark bread and other unified cereal products fruits, vegetables, pineapple, potatoes, strawberries	<ol style="list-style-type: none"> <li>1. Boosts immune system.</li> <li>2. Increases on-field endurance.</li> <li>3. Protects joints</li> </ol>	400 IU of vitamins 500 mg of vitamin C
Multivitamins	Full complements of fruits, vegetables, mushrooms	<ol style="list-style-type: none"> <li>1. Increases energy endurance and aerobic capacity</li> </ol>	200 micrograms of selenium, 400 units vitamin C, 1000 mg of calcium, 10-25mg of B-Complex
Glutamine	Raw spinach added to protein and carbohydrate drinks.	<ol style="list-style-type: none"> <li>1. Important for growth and homeostasis.</li> <li>2. Required for cellular replication in the immune system</li> </ol>	5 – 10g twice daily
Whey protein	As the best protein supplement in powder form it dissolves and is absorbed quickly	<ol style="list-style-type: none"> <li>1. Enhances the production of glutamine.</li> <li>2. Supplies energy.</li> <li>3. Initiates repair.</li> <li>4. Builds up muscle – destroying hormones and tissue.</li> <li>5. Eliminates excess fat and boosts the immune system.</li> </ol>	6 - 20g
ZMA (Zinc, Magnesium and Aspartate)	Whole grain cereals, nuts, meat, milk liver, green, vegetables and legumes, fish.	Boosts natural testosterone to near maximum levels	3 capsules daily before bed

Source: Dale, (2001); Flex, (2002); Adams, (2005).

### 2.3 Related Studies

Doherty and Smith (2004) used the meta-analytic approach to examine the effects of caffeine ingestion on exercise testing. Forty double-blind studies with 76 effect sizes (ES) met the inclusion criteria. The type of exercise test was classified as endurance, graded, or short-term. In comparison with placebo, caffeine improved test outcome by 12.3%.

Anastasio *et al.*, (2004), examined the effect of maltose-containing sports drinks on exercise performance. Ten subjects completed four trials. Each trial consisted of glycogen depletion protocol, followed by a 15 Min refuelling, after which subjects performed an hour test while consuming one of the experimental drinks (HGlu, glucose; Hmal, maltose; MalMix, sucrose, maltose, and maltodextrin; Plac, Placebo). Drinks provided 0.65 g/kg body weight. The data suggest that although carbohydrate drinks help to maintain plasma glucose at a higher level, no differences in performance could be detected after glycogen –depleting exercise. The proposed study will survey on the use of supplements in general.

Onywera *et al.* (2004) carried out a study on the food and macronutrient intake of elite Kenyan runners and compared these to recommendations for endurance athletes. Estimated energy intake (EI: 2987 + 293 Kcal; mean + standard deviation) was lower than energy expenditure (EE: 3605 + 119 kcal;  $p < 0.001$ ) and body mass (8M: 58.9 + 2.7 KGvs. 58.3 + 58.3 + 2.6;  $p < 0.001$ ) was reduced over the 7 day intense training period. The diet therefore, met most recommendations for the endurance athletes for macronutrient intake.

Jose *et al.* conducted a study on human exercisers. The findings showed that all competitors in various sports were tested on a bicycle ergometer at intervals during 24 hour period before the test. Four of them took five grams of potassium aspartate and five grams of magnesium aspartate. The other three took a placebo. Blood samples were taken before, during and after the test. Results showed blood ammonia concentrations were lower in the placebo group and endurance was boosted in the aspartate group. The study involved a small group of 7 men. It had experimental and control groups and concentrated on magnesium and potassium (Jose *et al.*, 2005).

Tipton *et al* (2001] conducted a study on competitive weight lifters. They took a liquid, high calorie supplement for 15 weeks to see the effect on weight gain, body composition and strength. They were divided into three groups, those using supplements and no anabolic steroids, those using the supplement plus anabolic steroids and a control group not using supplements. The supplements contained 540 calories and 70.5 grams of carbohydrates Results showed that weight gain in supplemented group was greater than the control group

Tremblay *et al.* (1984) studied the effect of riboflavin supplementation on performance on 14 top swimmers. The group was divided into two sub-groups matched for sex and performance. One group was supplemented for 60mg/day of riboflavin for 16 to 20 days. The other received a placebo. Performance was assessed by a swimming test consisting of 50m freestyle bouts. A treadmill test was performed to determine maximum aerobic power and ventilatory anaerobic threshold. Results showed that viboflavin supplement action did not affect biochemical indices for this vitamin in neither the blood nor performances of the swimmers.

Marconi *et al.*, (1982) conducted a study involving a double blind placebo-controlled experiment with 10 trained volunteers. A daily administration of 30mg/kg bodyweight of alpha-keto glutarate-pyrodociene complex over a period of 30 days, increased aerobic power by 6% and decreased lactate accumulation. No changes were observed in the control group of the same size.

## **2.4 Summary of Literature Review**

The ideal mix of nutrients from the diet should optimize rugby performance. However, there is very little published research on rugby and the effect of nutrition on rugby performance. Therefore, plenty of information from laboratory based studies on athletes from other sports can be applied to rugby (Tipton *et al.*, 2001). Studies by Casal *et al.*, (2001) emphasize on the need for pre-event carbohydrates that are easily digestible to prevent stomach cramps. Environmental conditions also influence nutrient utilization during performance. Research by Carkson (1998) shows that hot and humid environment give rise to risks of dehydration and heat injury. So, every care should be taken to hydrate athletes and monitor them on heat related illnesses. In cold environments, Adher *et al.*, (1988) state that respiratory fluid and sweat losses are common. Therefore, Freund and Sawka (1998) advice on increasing sodium contents by reducing carbohydrate in the diet.

In addition, other studies show that exercise intensity increases reliance on carbohydrates, while increased exercise duration reduces carbohydrate stores and protein utilization (Lemon, 1991a). Studies done elsewhere on the use of dietary supplements show that creatine monohydrate is the most popular supplement used by rugby players, Wagner (2005). Tipton *et al.*, 2000; and Esmarak *et al.*, [2001] also revealed that whey protein consumption can promote muscle and

increase strength. Brilla and Conte [[1999] in their study concluded that ZMA supplementation increases testosterone levels after suppression by hard straining activity like rugby. Rousseau *et al.*, (2004) conducted a study on antioxidants as a protective supplement. Whereas as Adams (2005) and Dale (2001) researched on glutamine as the most abundant amino acid and multivitamins are important for increased energy, endurance and aerobic capacity. The present study will therefore create awareness and establish utilization trends of dietary supplements by rugby players in Kenya.

## **CHAPTER THREE**

### **METHODS AND MATERIALS**

#### **3.1 Introduction**

This chapter describes the methodology that was used in the study. It presents a description of the research design, location of the study, target population, sample size and sampling techniques, research instruments, pilot study, procedure for data collection, data presentation and analysis.

#### **3.2 Research Design**

The descriptive survey research design was used in this study. The survey was deemed appropriate for gathering information or data about practices, opinions and attitudes (Mugenda and Mugenda, 1999). The descriptive survey was suitable for this study because the subjects, or respondents or players gave information related to the utilization trends of dietary supplements and factors that influence their utilization. There was no manipulation of the variables.

#### **3.3 Location of the Study**

The study was conducted at the training venues of the rugby teams taking part in the 2006 Kenya cup league. These included the Rugby Football Union of East Africa grounds, Nairobi Railway Club, University grounds, Impala Club grounds, Kenya Commercial Bank grounds in Ruaraka and University of Nairobi grounds.

### **3.4 Target Population**

The study targeted all the 7 teams that took part in the 2006 Kenya Cup League. There were 30 registered players per team hence totalling 210.

### **3.5 Sample Size and Sampling Procedure**

The study targeted all the 7 teams of the Kenya Cup Rugby League. These were Mean Machine (University of Nairobi), Impala, Mwamba United State International University (USIU), Kenya Commercial Bank (KCB), Harlequins and Nondescripts (Appendix C) Simple random sampling was used to select the players. Questionnaires were administered to twenty players per team, giving a total of 140 respondents. The respondents corresponding to the number picked were included in the sample. The 20 players per team formed (67%) of the total number of respondents which is a sufficient sample to use in descriptive survey research (Gay, 1976).

### **3.6 Research Instruments**

The researcher developed a questionnaire based on the 5 print Likert scale to collect data from the respondents. The questionnaire contained two sections; section (A) captured general information related to personal demographic data. Section B intended to determine, knowledge of dietary supplement, consumption of dietary supplements and, reasons for taking dietary supplements. (Appendix B).

### **3.7 Pilot Study**

The questionnaire was developed by the researcher based on a five print Likert scale. This was approved by the supervisors.. The purpose of this was to establish the validity and objectivity of

the research instrument and the feasibility of the entire research. A sample of 20 Kenya Commercial Bank Eric – Shirley League rugby players was randomly selected and questionnaires administered to them.

### **3.8 Validity and Reliability of the Instruments**

According to Nachmias and Nachmias (1999), validity is concerned with the question ‘Is the instrument meaning what it intends to measure?’, ‘It is the degree to which results obtained from the analysis of the data actually represent the phenomenon under study (Mugenda and Mugenda, 1999). Best and Kahn (1993) define validity as the degree to which a test measures what it purports to measure.

Split half method was used as a measure of reliability. The questions were scored (giving a mark for each relevant response and zero for each irrelevant or blank response). All the odd and even numbered items were grouped together. Each subject total score was computed from the two groups of items. The scores from the two groups were correlated. The results obtained from the reliability test gave a co-efficient of 0.85. Any instrument with a split half estimate between 0.8 and 1 is reliable (Gay, 1976, Mugenda and Mugenda, 1999).

According to Mugenda and Mugenda (1999), reliability is a measure of degree to which a research instrument yields consistent results or data after repeated trials. This is supported by Nachmias and Nachmias, (1999) who have noted that an instrument is reliable when it can measure a variable accurately and consistently as well as obtain the same results under the same

conditions over some period of time. Hence, it reflects the degree from which the research is free from error.

### **3.9 Procedure for Data Collection**

The researcher sought permission from the Ministry of Education (MoE) before embarking on data collection (Appendix D:). The researcher and the coaches identified suitable dates on which questionnaires were to be administered (Appendix A:). A total of 140 questionnaires were distributed and filled at the training venues with the players' consent. The questionnaires were distributed by the researcher and the players asked to fill and return them as soon as possible but not later than 24 hours. This ensured higher returns of the questionnaires.

### **3.10 Data Analysis and Presentation**

The Statistical Package for Social Sciences (SPSS) was used to analyse the data. Descriptive statistics were used to analyze descriptive data which generated frequencies, percentages, means and standard deviations. A Chi-square test ( $\chi^2$ ) computed at  $p \leq 0.05$  Level of significance was used to determine whether or not there were significant associations in the use of dietary supplements with age, level of education, occupation experience, and club affiliation.

## CHAPTER FOUR

### RESULTS AND DISCUSSION

#### 4.1 Introduction

This chapter presents the results of the study findings and discussions. The study objectives were guided by the formulation of hypotheses which were tested using chi-square ( $\chi^2$ ). The hypotheses acceptance or rejection were computed at  $p \leq .05$  level of significance.

##### 4.1.1 Analysis of Findings

This chapter deals with analysis and findings. The analysis was based on 140 (male rugby players). Questionnaires were filled correctly and returned within twenty four (24) hours. Chi-square ( $\chi^2$ ) was to determine whether there was a significant difference in the consumption of dietary supplements and reasons for taking the dietary supplements by Kenya cup rugby players based on their age, level of education, occupation, experience and club affiliate.

The analysis focussed on the following areas:

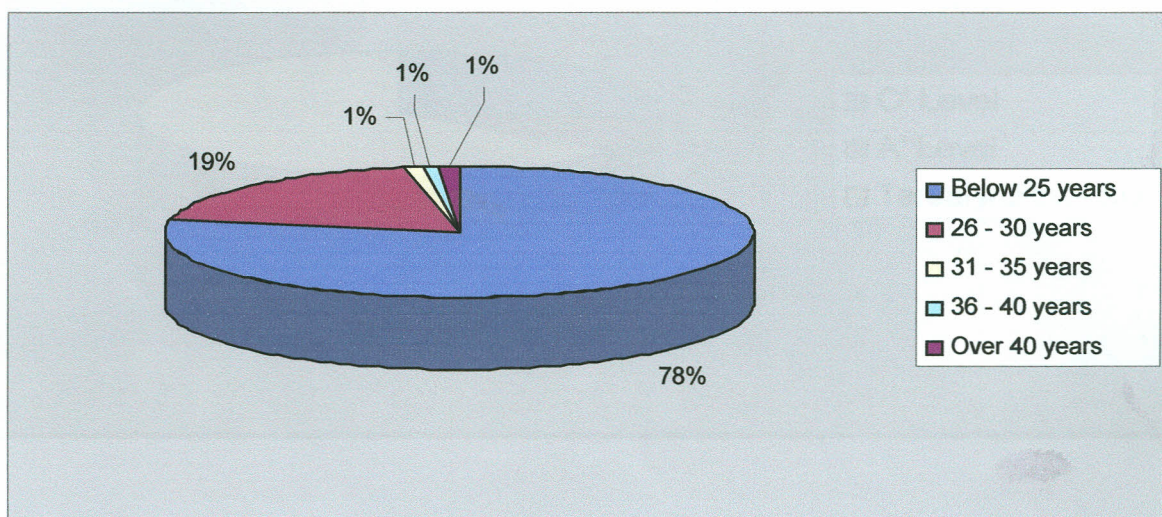
1. Demographic characteristics
2. Knowledge of dietary supplements
3. Consumption of dietary supplements
4. Reasons for taking dietary supplements

## 4.2 Demographic Information for the Respondents

### 4.2.1 Age of Respondents

The study involved 140 players of seven rugby teams that participated in the 2006 Kenya cup league. Majority (78%) of the participants were below 25 years, 19% were between 26-30 years while the rest (1%) were in the age brackets 31-35 years, 36-40 years and over 40 years respectively. It is important to note that the study involved male rugby teams only. Figure 4.1 presents the distribution of the respondents by age.

**Figure 4.1 Age Distribution of Respondents**



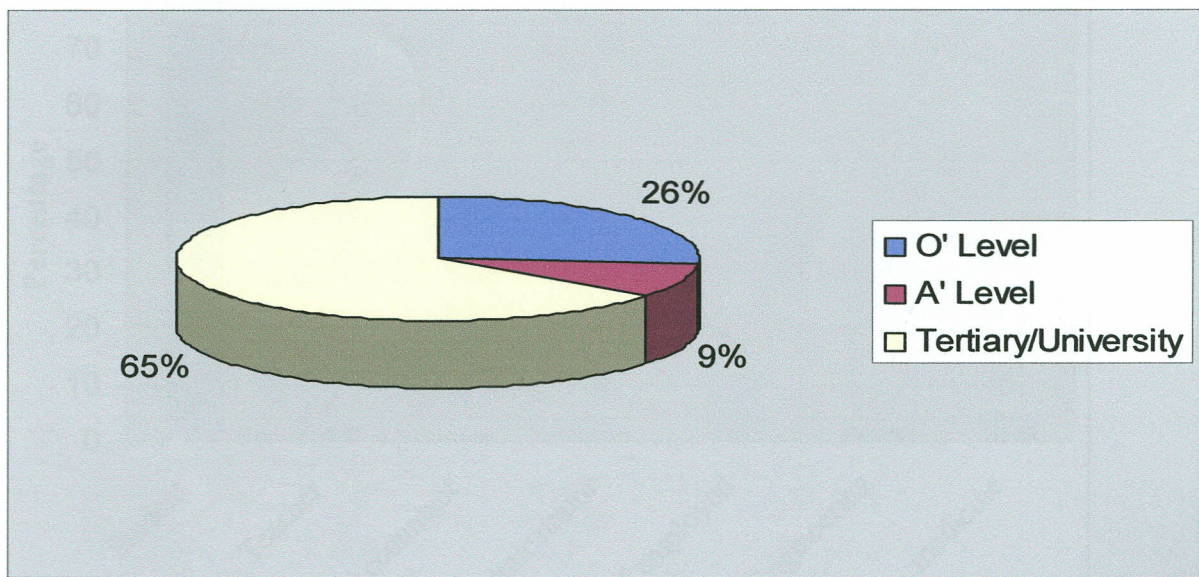
From the above findings, it is clear that most of the rugby players in Kenya were below the age of 25 years. This suggests that rugby in Kenya is not a professional sport and probably this explains why the percentages declined significantly as the players became older. This could also be attributed to the fact that most of the players aged above 30 years, have different careers which makes it difficult for them to find time to play the sport. In addition, from the age distribution, there is a clear indication that significant numbers of both the young and old engage in vigorous athletic training. However, the young require more protein supplementation since

inadequate amounts retard growth and affect training response (Food and Agricultural Organization 1985; US Food and Nutrition Board, 1989)

#### 4.2.2 Level of Education of the Respondents

The levels of education of the respondents have been shown in Figure 4.2:-

**Figure 4.2 Level of Education of the Respondents**



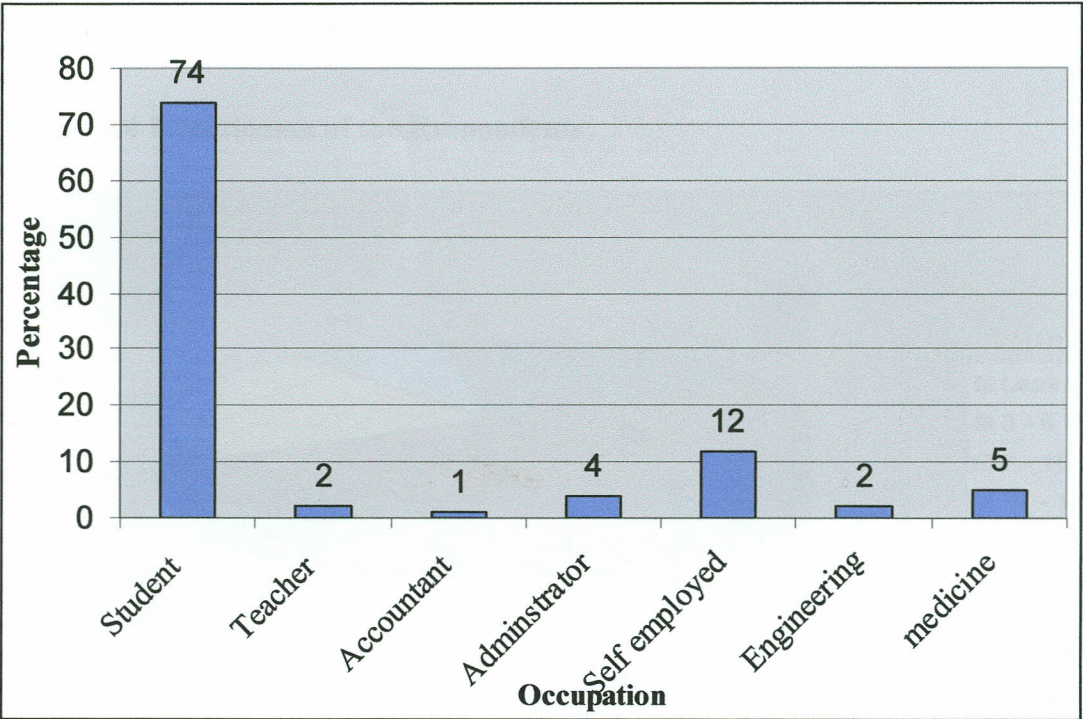
As illustrated in Figure 4.2, majority (65%) of the respondents had tertiary/university level of education, 26% had ordinary level and 9% had advanced level of education. Given this scenario, one can conclude that the game of rugby at Kenya cup league involves participants who possess high levels of education. The levels of education of the respondents are likely to have a positive influence on the use of dietary supplements by the rugby players. The findings also imply that players will have the capacity to assimilate the knowledge and appreciate the importance of food supplement in relation to their sport. This is supported by Nayge and Reed (1999) whose studies revealed that there is a greater use of supplements among adults with high level of education or

socio – economic status. Frank *et al* (2000) also notes that more years of education imply a greater awareness of the role of nutrition in good health.

### 4.2.3 Occupation of the Respondents

The distribution of occupation of the respondents presented in Figure 4.3:-

**Figure 4.3 Occupations of the Respondents**



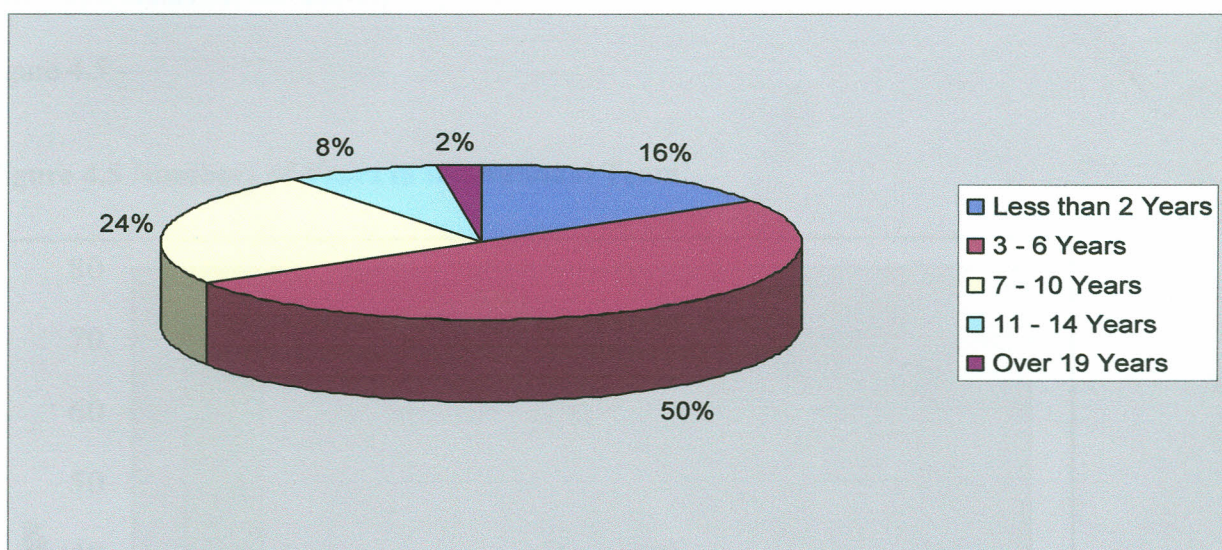
As indicated in Figure 4.3 above, majority of the respondents were students (74%), while a proportion of 12% were self-employed, 5% were involved in other occupations such as medicine, 4% of the respondents indicated that they were administrators, 2% were either engineers or teachers while 1% were accountants.

From the above findings, it can be inferred that majority of the players who are mainly students, may not be able to afford the cost of the dietary supplements. The implication is that there are likely to be fewer users of dietary supplement among students. This is supported by Janet *et al* (2002) who notes that participants whose lifestyles are healthier tend to use dietary supplements.

#### 4.2.4 Experience of the Respondents

The respondents on the experience of the respondents are reflected in figure 4.4:-

**Figure 4.4 Experiences of the Respondents**



On the experience of the players, a higher (50%) of the respondents stated that they had 3 – 6 years of experience, 24% had 7 – 10 years, 1% had less than 2 years experience, 8% of the respondents had 11- 14 years experience and 2% had over 19 years.

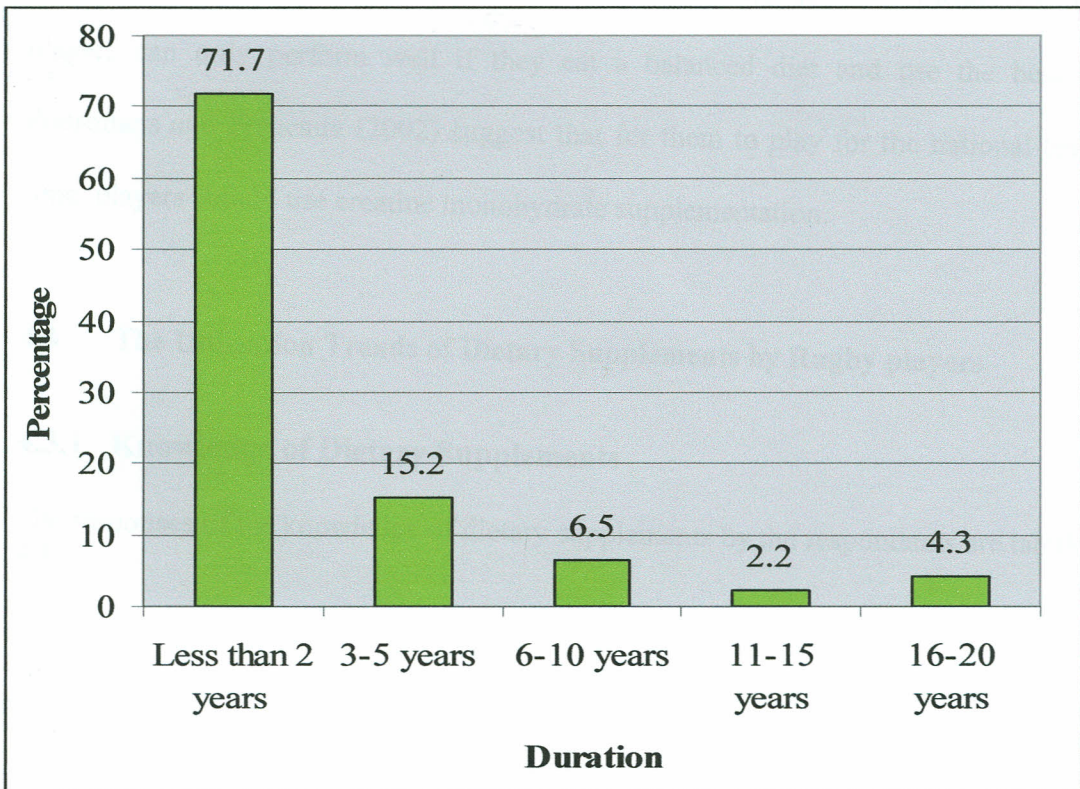
From the responses of the players, there is clear indication that majority of the respondents had had some experience in playing with their teams. It is evident that majority of the rugby players had played for their respective teams for a minimum period of 3 – 6 years and a maximum of 11

– 14 years as shown in figure 4.4. Many of them tend to affiliate with their teams for a longer duration. In order for them to play for their teams for such a long time, they are expected to perform well. This is consistent with the findings of Slesinki *et al*, (1996) who revealed that engaging in regular physical activity is positively associated with dietary supplements used. Other studies by Brilla and Conte (1999) showed that ZMA is widely used by endurance and strength training athletes such as footballers, body builders, sprinters and rugby players.

#### 4.2.5 Number of Years in the National Team

The respondents on the number of years in the national team of the respondents are presented in figure 4.5:-

**Figure 4.5 Numbers of Years in the National Team**



Majority (71.7%) of the respondents had played in the national team for less than 2 years, 15.2% for a period of 3 – 5 years, 6.5% for 6 – 10 years, 2.2% had played for a period of 11-15years, while 4.3% had played for a period between 16 and 20 years. This is an indication that most players who play in the national team do not play for a long period as compared to the duration they played for the teams they were affiliated to.

It is evident from Figure 4.5 that majority of the respondents had less than 2 years experience in the national team. This could be attributed to the high level of competition in the national team. This means that if one cannot perform well, he is excluded from the national team. For one to perform well, he requires energy and above all, good health which can be derived from the dietary supplements. This is supported by Myles and Thomas (1994) who revealed that rugby players can only perform well if they eat a balanced diet and use the best supplements. Poortmans and Francaux (2002) suggest that for them to play for the national team for a long time, players should use creatine monohydrate supplementation.

### **4.3 The Utilization Trends of Dietary Supplements by Rugby players**

#### **4.3.1 Knowledge of Dietary Supplements**

The responses of the knowledge of dietary supplements by the respondents are tabulated in table 4.1:-

**Table 4.1: Knowledge of Dietary Supplements**

Supplements	Yes		No	
	F	%	F	%
Creatine Monohydrate	53	44.9	65	55.1
Antioxidants	11	11.3	86	88.7
Multi-Vitamins	46	44.2	58	55.8
Glutamine	13	14.1	79	85.9
Whey protein	35	33.3	70	66.7
ZMA (Zinc, Magnesium and Aspartate)	8	8.6	85	91.4

Table 4.1 shows that majority (55.1%) of the respondents had no knowledge about creatine monohydrate, as opposed to 44.9% who indicated that they were aware of it. However, Creatine monohydrate is the most popular supplement used by rugby players (Wagner 2005). This is supported by Poortmans and Francaux (2000) in their study of 300 elite performers which concluded that 100% of rugby league players used it.

As far as the knowledge of antioxidants is concerned, only 11.1% of the respondents admitted that they were aware about it, while 88.7% stated that they were ignorant. These results indicate that majority of these players had not used antioxidants despite the research carried out by Rousseou *et. al*, (2004) on 118 well trained athletes which showed that antioxidants played a protective role among athletes.

From the responses, 44.2% of the respondents indicated that they had knowledge on multi-vitamins. This implies that even though these players use vitamins, they only go for those food supplements which are cheaper (because of their occupation) and have isolated vitamins.

However, Adams (2005) recommends a whole food concentrate of vitamins rather than isolated ones for endurance and aerobic capacity.

From the responses 14.1% of the respondents had knowledge on glutamine, while majority (85.9%) of the respondents had no knowledge of glutamine as shown in Table 4.1 yet it is necessary as an energy source for cells lining the intestine. Evidence shows that it is the largest fuel amino-acid for athletes (Adams, 2005, Dale, 2001).

Whey protein was a common dietary supplement for only 33.3% of the respondents and most of the respondents as portrayed by 66.7% response rate were not aware of it. Whey protein is the best protein source because it is absorbed quickly to reach muscles for provision of energy and initiate repair of worn out tissues. Chronic consumptions of a protein supplement immediately after exercise promotes muscle mass and increases strength (Tipton *et al* 2000)

As far as of Zinc, Magnesium and Aspartate (ZMA) is concerned, 91.4% of the respondents indicated that they did not have any knowledge of it and only a minority (8.6%) seemed to know it. The supplementation of ZMA boosts the levels of testosterone (a growth hormone) which is always suppressed by hard physical training (Brilla and Conte 1999).

From the study findings shown in Table 4.3., it can be generalized that majority of the Kenya rugby players have little knowledge of the dietary supplements which is likely to have a negative impact in their utilization. In terms of rating, creative monohydrate was more familiar to the players, followed by, multi-vitamins, Whey protein, glutamine, antioxidants and least known was Zinc, Magnesium and Aspartate (ZMA).

### 4.3.2 Consumption of Dietary Supplements

The study sought to establish the consumption of dietary supplements among the Kenyan rugby players. The respondents were to state how frequent they consume the supplements by rating the provided statements using a 3 point scale i.e.1 =often, 2= seldom, 3=never. The responses are illustrated in the Table 4.2 below.

**Table 4.2: Consumption of Dietary Supplements**

Statement depicting the consumption of the supplements	Frequency	Often	Seldom	Never	Mean	Std. Dev
		%	%	%		
I take dietary supplements	106	15.1	31.1	53.8	2.41	.78
I usually enjoy taking dietary supplements	101	21.8	19.8	58.4	2.45	.92
I do not want to take dietary supplements	92	28.3	20.7	51.0	2.25	.91
A balanced diet is more essential than dietary supplements	109	60.6	23.9	15.6	1.55	.75
I do not like dietary supplements	86	21.0	31.4	47.6	2.31	.88
I am not motivated to take dietary supplements	89	31.5	20.2	48.3	2.17	.88

From Table 4.2, it is evident that majority (53.8%) of the respondents never took the dietary supplements, 31.1% indicated that they rarely took the supplements and only a minority (15.11% confirmed that they often took the dietary supplements.

On whether the respondents enjoyed taking the dietary supplements, 15.1% of the respondents indicated that they took the dietary supplements more often, 31.1% seldom and 53.8% of the

respondents never took the dietary supplements. The mean scores also showed that the players seldom enjoy taking the supplements.

The respondents view on whether they wished to take the dietary supplements was sought and 28.3% of the respondents indicated that they will not take the dietary supplements often, 20.7% of them would seldom want to take them. Majority (51%) of the respondents never wanted to take dietary supplements. The players would seldom wish to take the dietary supplements as the mean score (2.25) indicated.

The study also sought to underscore the views of the respondents on the importance of a balanced diet. As indicated in Table 4.3., 60.6% of the respondents had a perception that a balanced diet was more essential than dietary supplements and therefore they tend to take it more often as indicated by a mean of 1.55. Some (23.9%) of the respondents indicted it as essential and 15.6% never considered it as essential. The overall observation is that a balanced diet is more preferred to dietary supplements.

The study also established whether the respondents were motivated to take dietary supplements, 31.5% were often motivated, 20.2% of the respondents indicated that they were seldom motivated while 48.3% were not motivated to take the dietary supplements. The implication here is that generally, dietary supplements motivate the respondents..

It is noted from the results of this study that majority of the players never took dietary supplements, did not want to take the dietary supplements, neither enjoyed taking nor were they motivated to take the supplements. This also indicates that seldom do the players consume the

dietary supplements. This can be attributed to the fact that majority of the players who were mainly students, may not be able to afford the cost of the dietary supplements. Indeed supplements alone are very expensive. However, those few players who were employed in various occupations had the money to buy the supplements. On the other hand, the limited knowledge of these players on the available dietary supplements can also affect negatively their consumption since as indicated in Table 4.2; majority did not have the knowledge of the dietary supplements.

**The Kenya Cup Rugby players' consumption of dietary supplements on the basis of their demographic characteristics**

The Kenya Cup Rugby players' consumptions of dietary supplements on the basis of age is shown in Table 4.3 below:-

**Table 4.3: Kenya Cup Rugby Player's Consumption of Dietary Supplements on the Basis of their Age**

**TEST STATISTICS**

Age	Chi-Square $\chi^2$	df	<0.05 (Sig)
I take dietary supplements	90.190	4	.000
I usually enjoy taking dietary supplements	92.317	4	.000
I don't want to take dietary supplements	60.556	4	.000
A balanced diet is more essential than dietary supplements	35.908	4	.000
I don't like dietary supplements	50.047	4	.000
I'm motivated to take dietary supplements	52.517	4	.000

The Chi square analysis of the sub- hypothesis  $H_{01 (i)}$ : that there would be no significant difference between the consumption of the dietary supplements and the age of rugby players was  $P < 0.05$  for all cases. Therefore the null hypothesis was rejected. This shows that there is a significant relationship between the rugby players' age and consumption of dietary supplements. This is supported by US Food and Nutrition board (1989) and Food and Agriculture Organization (1985) who revealed that both young and old people who engage in hard vigorous training use dietary supplements. The general impression is that a majority (78%) of the respondents were below 25 years and had little knowledge about the supplements. This implies that they are likely not to consume dietary supplements.

The Kenya Cup Rugby players' consumption of dietary supplements based on their level of education is shown in Table 4.4 below:-

**Table 4.4: Kenya Rugby Player's Consumption of Dietary Supplements on the Basis of their Level of Education**

**TEST STATISTICS**

Level of Education	Chi-Square $\chi^2$	df	<0.05 (Sig)
I take dietary supplements	90.190	4	.000
I usually enjoy taking dietary supplements	92.317	4	.000
I don't want to take dietary supplements	60.556	4	.000
A balanced diet is more essential than dietary supplements	35.908	4	.000
I don't like dietary supplements	50.047	4	.000
I'm motivated to take dietary supplements	52.517	4	.000

The Chi square analysis of the sub- hypothesis  $H_{01 (ii)}$ : that there would be no significant difference between the consumption of the dietary supplements and the level of education of

rugby players was  $P < 0.05$  for all cases. Therefore, the null hypothesis was rejected. This is in consistent with the results of Nayge and Reed's (1999) study which revealed that there is greater use of dietary supplements among adults of high socio-economic status. It implies that they are aware of the role of nutrition promoting in good health.

The Kenya Cup Rugby players' consumption of dietary supplements based on their occupation.

**Table 4.5: Kenya Cup Rugby Players' Consumption of Dietary Supplements on the Basis of their Occupation**

**TEST STATISTICS**

Occupation	Chi-Square $\chi^2$	df	<0.05 (Sig)
I take dietary supplements	90.190	4	.000
I usually enjoy taking dietary supplements	92.317	4	.000
I don't want to take dietary supplements	60.556	4	.000
A balanced diet is more essential than dietary supplements	35.908	4	.000
I don't like dietary supplements	50.047	4	.000
I'm motivated to take dietary supplements	52.517	4	.000

A significant difference was established with regard to the consumption of dietary supplements on the basis of the occupation of the rugby players. The Chi square analysis of the sub-hypothesis  $H_{01}$  (iii): that there would be no significant difference between the consumption of the dietary supplements and the age of rugby players was  $P < 0.05$  for all cases. Therefore the null hypothesis was rejected. This is in consistent with the study by Janet *et. al*, (2002) whose study revealed that participants leading healthier lifestyles tend to use dietary supplements. The

respondents who are employed in career jobs like accounting and administration have the ability to purchase the supplements. Therefore, they are likely to consume them.

The Kenya Cup Rugby players' consumption of dietary supplement based on their experience is shown in the Table 4.6 below:-

**Table 4.6: Kenya Cup Rugby Players' Consumption of Dietary Supplements on the Basis of their Experience**  
**TEST STATISTICS**

Experience	Chi-Square $\chi^2$	df	<0.05 (Sig)
I take dietary supplements	90.190	4	.000
I usually enjoy taking dietary supplements	92.317	4	.000
I don't want to take dietary supplements	60.556	4	.000
A balanced diet is more essential than dietary supplements	35.908	4	.000
I don't like dietary supplements	50.047	4	.000
I'm motivated to take dietary supplements	52.517	4	.000

A significant difference was established between the consumption of dietary supplements the levels of experience of the rugby players. The Chi square analysis of the sub- hypothesis  $H_{01}$  (iv): that there would be no significant difference between the consumption of the dietary supplements and the age of rugby players was  $P < 0.05$  for all cases. Therefore the null hypothesis was rejected. This is inconsistent with the study conducted by Poortmans and Franceux (2000) among Rugby league players. It revealed that 100% elite rugby players used creatine monohydrate. For rugby players to be regarded as elite, implies that they have actually played the game of rugby for a long time in order for them to qualify to be professionals.

Creatine monohydrate speeds up the rate of recovery since the phosphocreatine is synthesized quickly. The implication of this finding is that the trend of the athletes in general and rugby players in particular is in the direction of utilization of dietary supplements. These have been used before and found that they improve performance. The findings are likely to change if rugby as a sport is made professional in Kenya.

The Kenya Cup Rugby players' consumption of dietary supplements on the basis of their affiliation is shown in the table below.

**Table 4.7: Kenya Cup Rugby Players' consumption of Dietary Supplements on the Basis of their Club Affiliation**

**TEST STATISTICS**

Club Affiliation	Chi-Square $\chi^2$	df	<0.05 (Sig)
I take dietary supplements	90.190	4	.000
I usually enjoy taking dietary supplements	92.317	4	.000
I don't want to take dietary supplements	60.556	4	.000
A balanced diet is more essential than dietary supplements	35.908	4	.000
I don't like dietary supplements	50.047	4	.000
I'm motivated to take dietary supplements	52.517	4	.000

The Chi square analysis of the sub- hypothesis  $H_{01} (v)$ : that there would be no significant difference between the consumption of the dietary supplements and the age of rugby players was  $P < 0.05$  for all cases. Therefore the null hypothesis was rejected. This implies that there is a significant relationship between the club affiliation and the consumption of dietary supplements.

The data analysis so far reported shows that there was a significant difference in the consumption of dietary supplements on the basis of the players' club affiliation, age, level of education, occupation and experience. It also shows that the consumption rates of dietary supplements among the players were also low and this could be attributed to low levels of knowledge on the dietary supplements. The preference of a balanced diet to dietary supplements was shown by majority of the respondents and this is supported by studies conducted by Saris *et al*, (1989), Myles and Thomas (1998) who confirmed that a balanced diet is more preferred than dietary supplements if taken adequately. On the other hand, studies have shown that rugby players have consumed dietary supplements before. For instance a study by Ahmum *et al* (2000) shows that in highly trained rugby players, a dose of creatine monohydrate of 20g per day for 5 days improved sprint performance in repeated running sprints. In addition, a study by Tipton *et al* (2001) revealed that protein consumption increases muscle size and dynamic strength. Lastly, Brilla and Conte (1999) reported that ZMA is widely used by endurance athletes such as runners, cyclists and wrestlers and strength training athletes like footballers, body builders and rugby players.

### **4.3.3 Reasons for Taking Dietary Supplements**

The study sought to establish from the Kenya cup rugby players, the reasons as to why they took the dietary supplements. The responses are illustrated in the Table 4.8.

**Table 4.8 Reasons for taking dietary supplements**

Reason	Frequency	Often	Seldom	Never	Mean	Std. Dev
		%	%	%		
I excel in my sport when I take dietary supplements	89	41.6	13.5	44.9	2.06	.98
Dietary supplements are worthwhile and necessary	99	52.5	21.2	26.7	1.76	.90
Dietary supplements are not enjoyable and stimulating	84	16.7	22.6	60.7	2.44	.77
Dietary supplements are not important to every life	81	19.8	37.0	43.2	2.23	.76
I take dietary supplements because I cannot afford a balanced diet	81	7.4	12.3	80.3	2.80	.70
I take dietary supplements with my friends	73	6.8	17.8	75.3	2.74	.71

As illustrated in Table 4.8, 41.6% of the respondents indicated that they often excelled due to supplement intake, 13.5% seldom, took the dietary supplements while a higher proportion (44.9%) of the respondents expressed that their performance was not due to dietary supplement intake. Averagely, the results indicate that seldom (2.06), did the intake of dietary supplements contribute to the Kenya Cup Rugby players' excellence in sports. This means that there are other factors besides the dietary supplement which enable these players to excel in the game of rugby. To establish whether the supplements were worthwhile and necessary for the players, majority or 52.5% of the respondents indicated that it was necessary to use them quite often.

On the other hand, 26.7% of the respondents indicated that the supplements were not necessary. Although the dietary supplements are worthwhile and necessary, most of the respondents, having been students, could not afford to purchase and use them. On the question of whether it was enjoyable to take the dietary supplements, the study established that majority of the respondents (60.7%) indicated that they did not enjoy taking the supplements. However, 22.6% of the respondents seldom enjoyed while only proportion of 16.7% enjoyed taking the supplements.

This is consistent with the fact that since most of the respondents had little knowledge of the supplements, it is possible that they found it unnecessary to buy them.

With regard to whether the supplements were important for daily life, 43.2% of the respondents indicated that they were not necessary at all, 37% that they were a little bit important, while the least proportion (19.8%) indicated that the supplements were necessary and important for life. The respondents who had knowledge of the dietary supplements and had money to buy them had a reason to utilize them.

Majority of the respondents accounting for by 80.3% response rate never consumed dietary supplements because they could afford a balanced diet. Actually a balanced diet is cheaper as compared to dietary supplements. A minority (7.4%) however, showed that they consumed the dietary supplements quite often because they could afford them. From the mean score analysis, it is an indication that even though the respondents consumed the dietary supplements, it is not as a result of a balanced diet being expensive, rather they were able to afford it or they had some knowledge of the importance of the dietary supplements.

### **The Kenya Cup Rugby Players' Reasons for Taking Dietary Supplements on the Basis of their Demographic Characteristics**

The Kenya rugby player's reasons for taking dietary supplements on the basis of their age are shown in Table 4.9 below:

**Table 4.9: Chi-square Analysis of Reasons for Taking Dietary Supplements Based on their Age**

**TEST STATISTICS**

Age	Chi-Square $\chi^2$	df	<0.05 (Sig)
I excel in my sport when I take dietary supplements	38.023	4	.000
Dietary supplements are worthwhile and necessary	18.531	4	.001
Dietary supplements are not enjoyable and stimulating	89.333	4	.000
Dietary are not important to every life	44.750	4	.000
I take dietary supplements because I cannot afford a balanced diet	169.291	4	.000

The Chi-square analysis as shown in table 4.9 above shows that there was a significant difference amongst the Kenya Rugby Players' reasons for taking dietary supplements on the basis of their age. The Chi square analysis of the sub- hypothesis  $H_{01(i)}$ : that there would be no significant difference between the consumption of the dietary supplements and the age of rugby players was  $P < 0.05$  for all cases. Therefore the null hypothesis was rejected... From the demographic information, there was a clear indication that the ages were varied. However, although most of the respondents were below 25 years, and the rest distributed respectively, there is a general awareness of dietary supplements and the importance to sports. This is inconsistent with Biscombe's (1999) study which revealed that rugby is a multimillion dollar sport. Burke and Manham (2000) also revealed that dietary supplements prevent deficiencies in order for the players to resist illnesses and stay healthy so as to excel.

**Table 4.10: Chi-square Analysis of Reasons for Taking Dietary Supplements Based on their Level of Education**

**TEST STATISTICS**

<b>Level of Education</b>	<b>Chi-Square <math>\chi^2</math></b>	<b>df</b>	<b>&lt;0.05 (Sig)</b>
I excel in my sport when I take dietary supplements	38.023	4	.000
Dietary supplements are worthwhile and necessary	18.531	4	.001
Dietary supplements are not enjoyable and stimulating	89.333	4	.000
Dietary are not important to every life	44.750	4	.000
I take dietary supplements because I cannot afford a balanced diet	169.291	4	.000

A significant difference between the Kenya Rugby Players' reasons of taking dietary supplements based on their academic qualification was established as indicated in the Chi-square analysis shown in Table 4.10. The Chi square analysis of the sub- hypothesis  $H_{01}$  (ii): that there would be no significant difference between the consumption of the dietary supplements and the age of rugby players was  $P < 0.05$  for all cases. Therefore the null hypothesis was rejected... The level of education for respondents is relevant because they are able to generate awareness and comprehend the dietary supplements offered on the market. A study by Frank *et al* (2000) support the idea that many years of education will enhance an awareness of the role of nutrition in good health. Hence there is a substantial relationship between the respondents' level of education and reasons for taking dietary supplements.

The Kenya cup rugby players' reasons for taking dietary supplements based on their occupation are shown in Table 4.11 below:-

**Table 4.11: Chi-square Analysis of Reasons for Taking Dietary Supplements Based on their Occupation**

**TEST STATISTICS**

<b>Occupation</b>	<b>Chi-Square <math>\chi^2</math></b>	<b>df</b>	<b>&lt;0.05 (Sig)</b>
I excel in my sport when I take dietary supplements	38.023	4	.000
Dietary supplements are worthwhile and necessary	18.531	4	.001
Dietary supplements are not enjoyable and stimulating	89.333	4	.000
Dietary are not important to every life	44.750	4	.000
I take dietary supplements because I cannot afford a balanced diet	169.291	4	.000

As indicated in Table 4.11, all variables statements depicting the reasons for taking dietary supplements by the Kenya Rugby Players. The Chi square analysis of the sub- hypothesis **H<sub>01</sub>** (iii): that there would be no significant difference between the consumption of the dietary supplements and the age of rugby players was  $P < 0.05$  for all cases. This shows that there would be a significant difference in Kenya rugby player's reasons for taking dietary supplements on the basis of their occupation. Therefore, the null hypothesis was rejected. The occupation of the respondents will definitely dictate the lifestyles of the players' (Janet *et al* 2002). Those who have careers have the capacity to improve their performances by supplementing their diet. The students may have no option but play to the best of their abilities. It is proved from several studies that elite players who excel tool dietary supplements. This is supported by Steven (2002) who notes that dietary supplements take rugby players to the next level.

**Table 4.12: Chi-square analysis of reasons for taking dietary supplements based on their Experience**

**TEST STATISTICS**

<b>Experience</b>	<b>Chi-Square <math>\chi^2</math></b>	<b>df</b>	<b>&lt;0.05 (Sig)</b>
I excel in my sport when I take dietary supplements	38.023	4	.000
Dietary supplements are worthwhile and necessary	18.531	4	.001
Dietary supplements are not enjoyable and stimulating	89.333	4	.000
Dietary are not important to every life	44.750	4	.000
I take dietary supplements because I cannot afford a balanced diet	169.291	4	.000

Chi-square analysis as shown in Table 4.12 indicated that there was a significant difference between the Kenya rugby players' reasons for taking dietary supplements and their experience. The Chi square analysis of the sub- hypothesis  $H_{01 (iv)}$ : that there would be no significant difference between the consumption of the dietary supplements and the age of rugby players was  $P < 0.05$  for all cases. Therefore null hypothesis was rejected in view of this finding.

The respondents who play the game of rugby for a long time will definitely have a reason for taking dietary supplements. They have to perform or excel in the sport consistently in order to be retained in the team/club. Apart from physical conditioning and thorough practice of the skill, the trend is towards supplementing the balanced diet with dietary supplements (Brilla and Conte 1999).

The Kenya cup rugby players' reasons for taking dietary supplements based on their club affiliation are shown in Table 4.13 below:-

**Table 4.13: Chi-square Analysis of Reasons for Taking Dietary Supplements Based on their Club Affiliation**

**TEST STATISTICS**

<b>Club Affiliation</b>	<b>Chi-Square <math>\chi^2</math></b>	<b>df</b>	<b>&lt;0.05 (Sig)</b>
I excel in my sport when I take dietary supplements	38.023	4	.000
Dietary supplements are worthwhile and necessary	18.531	4	.001
Dietary supplements are not enjoyable and stimulating	89.333	4	.000
Dietary are not important to every life	44.750	4	.000
I take dietary supplements because I cannot afford a balanced diet	169.291	4	.000

Chi-square analysis as shown in the table 4.13 indicates that there was a significant difference between the Kenya Rugby Players' reasons of taking dietary supplements and the club affiliation. The Chi square analysis of the sub- hypothesis  $H_{01(v)}$  that there would be no significant difference between the consumption of the dietary supplements and the age of rugby players was  $P < 0.05$  for all cases. Therefore the null hypothesis was rejected

Indeed, it is evident that there is a relationship between the reasons for dietary supplements based on the players' club affiliation. Performing at a Kenya Cup Rugby level places a lot of demand on the players. They need to perform consistently well in order to be retained in the team. This is supported by Myles and Stephen (2002) who revealed that rugby players' can only perform well if they eat a balanced diet and use the dietary supplements that money can buy.

The data analysis that has been conducted shows that the null hypothesis that there is no significant difference between the Kenya rugby players' reasons for taking dietary supplements and their demographic characteristics (club affiliation, age, level of education, occupation and

experience) was not supported. The rejection of the hypothesis appears to be consistent with the results of Myles and Thomas (1998) which noted that the game of rugby involves smashing and tackling opponents and in order for one to perform well, one has to eat a balanced diet and use the best nutritional supplements that money can buy. Supplements help to maximize one's natural athletic ability (Steven, 2002). This is further supported by Biscombe (1998) who argues that since rugby has become a multimillion dollar sport, supplements will enhance strength, endurance, power and speed, Burke and Meinham (2000) also reveal that dietary supplements prevent deficiencies so that players can resist illness in order to stay healthy and perform well. Lastly, supplements promote explosive power and aid in quick recovery (Wagner 2005; Rousseau et al 2004). However, the utilization of such supplements vary with the club affiliation, age of the player, academic qualification, occupation and personal experience in the game.

## CHAPTER FIVE

### SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter deals with the summary of findings, conclusions and recommendations. The findings will guide policy formulation and further research. To achieve the intended objectives, the study was guided by the following hypotheses:-

- a) There would be no significant difference in the consumption of dietary supplements by

Kenya cup players based on their:

- (i) Age
- (ii) Level of Education
- (iii) Occupation
- (iv) Experience
- (v) Club Affiliation.

- b) There would be no significant difference in the reasons for taking dietary supplements by

Kenya cup rugby players based on their:

- (i) Age
- (ii) Level of Education
- (iii) Occupation
- (iv) Experience
- (v) Club Affiliation.

## 5.2 Summary

The following conclusions can be highlighted based on the study.

- i. Majority (78%) of the players who took part in the Kenya cup league were below the age of 25 years. As far as their level of education was concerned, 65% of the players had tertiary or university education. Similarly, 74% of the players' occupations were students. As for their experience, 50% of the players had played rugby between 3 – 6 years. While 71.7% of the players had played rugby for the national team in less than 2 years.
- ii. Kenya Cup Rugby Players had little knowledge about the dietary supplements. The positive responses on the players' knowledge levels of the supplements were as follows: Creatine monohydrate scored 44 %, antioxidants got 11.3 % multivitamins had 44.2 %, glutamine got 14.1 %, whey protein scored 33.3 % where as ZMA (zinc magnesium and aspartate) got 8.6 % positive responses.
- iii. Significant differences were shown in the consumption of dietary supplements by the Kenya cup rugby players based on their club affiliation, age, level of education, occupation and experience.
- iv. Similarly, the findings showed that there was a significant difference in the reasons for taking dietary supplements by Kenya Cup Rugby Players on the basis of club affiliation, age, level of education, occupation and experience.

## 5.3 Conclusions

The following conclusions are drawn from the findings of the study:-

Based on the demographic characteristics of the Kenya cup rugby players, most of the players were generally young. This enables them to withstand the sport which is believed to be

physically demanding. Hard training increases both aerobic and anaerobic capacity. This in turn minimises muscle soreness. Since a higher proportion had attained tertiary/university education, they are able to appreciate the importance of nutrition for good health. Additionally, in order for them to play for their respective clubs and the national team for a long time, they are expected to be physically fit which would otherwise assist them to consistently perform well. Hence play at both levels for a long time.

As far as knowledge of dietary supplements is concerned, at least the positive responses in the dietary supplements that were investigated implies that there is a basic foundation upon which the stake holders can built in order to create public awareness. This will give them room to differentiate between the legal and illegal supplements. It was interesting to note that there is a relationship between the variables investigated in the study and the consumption of dietary supplements. This implies that the study was relevant and it serves a basis for further research.

Lastly, there is a relationship between the variables investigated in the study and the reasons for taking dietary supplements by Kenya cup rugby players.

#### **5.4 Recommendations for Policy Formulation and Implementation**

Based on the conclusions of the study, the following recommendations for policy formulation were made:

- i. The government and Kenya Football Rugby Union should make the game of rugby a professional sport. This will enable players of all ages to actively participate as opposed

to the findings of the present study which showed that 75% of the players had been students below the age of 25 years..

- ii. Kenya Rugby Football Union should organize clinics, seminars and courses for rugby coaches in order to enlighten them on the right dietary practices of the players. The various rugby teams should constitute technical benches inclusive of nutritionists or dieticians. This will increase the players' knowledge of dietary supplements and nutrition in general.
- iii. The Ministry of Youth and Sports in conjunction with the Ministry of Public Health should organize awareness campaigns about the importance of a balanced diet and dietary supplements.

## **5.5 Suggestions for Further Research**

The following are possible ones for further research;

- (i) There is need to conduct research on other rugby teams in the country apart from those that participate in the Kenya Cup league. This can target such areas as the teams in the secondary schools (both private and public), teacher training colleges and university teams. This can establish a more general awareness of dietary supplement intake by the players.
- (ii) There is also need to conduct research on other dietary supplements apart from those examined in the study. This will increase evidence based information on dietary supplements in Kenya.

- (iii) The findings of the study are based on age, level of education, occupation, experience and club affiliation. There is need to conduct research to establish whether there are other variables or not.
- (iv) There is also need to use another instrument to gather data apart from questionnaires since this was a descriptive survey research design. Perhaps a study design, involving experimentation would enhance research on dietary supplementation.

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## Appendix A: Letter of Introduction

The Coach

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Dear Sir,

### **SUBJECT: REQUEST TO CONDUCT RESEARCH**

I am currently a postgraduate student in the department of Exercise and Sports Science at Kenyatta University. As part of the requirements for the award of an MSc. degree. I am expected to carry out a research and present a thesis on the same. My research is focused on utilization of dietary supplements among rugby players.

Your team has been identified as a useful resource/source of the information. In this regard you (Members of the team) are kindly requested to complete the enclosed questionnaire and return to the researcher.

Any information provided will be treated with strict confidence and will only be used for the intended research.

Your Cooperation will be highly appreciated.

Yours faithfully,  
Elizabeth Mse  
Kenyatta University  
Department of Exercise Recreation and Sports Science.  
P.O. Box 43844  
Nairobi

## Appendix B: Players' Questionnaire

### SECTION A. DEMOGRAPHIC DATA

1. Name of the club \_\_\_\_\_

2. Age (tick as appropriate)

Below 25 years

25 - 30 years

31 - 35 years

36 - 40 years

41 - 45 years

Over 45 years

3. Your highest academic qualification (tick as appropriate)

O' level

A' level

Tertiary/ University

Any other (Please specify) \_\_\_\_\_

4. Occupation (tick as appropriate)

Student

Teacher

Accountant

Administrator

Self employed

Engineer

Doctor

Lawyer

Any other (Please specify) \_\_\_\_\_

5. Experience as a player. (Tick as appropriate)

Less than 2 years

2 - 5 years

6 - 10 years

11 - 15 year

16 - 20 years

Over 20 years

6. How long have you played for the national team?

Less than 2 years

3-5 years

6-10 years

11-15 years

16-20 years

Over 20 years

**SECTION B - GENERAL INFORMATION ON THE USE OF DIETARY SUPPLEMENTS.**

a) Knowledge of dietary supplements

Which of the following supplements do you know?

	Yes	No
1. Creatine Monohydrate		
2. Antioxidants		
3. Multi – Vitamins		
4. Glutamine		
5. Whey protein		
6. ZMA (Zinc, Magnesium and Aspartate)		

b) Consumption of the Dietary Supplements

	Often	Seldom	Never
1. I take dietary supplements			
2. I usually enjoy taking dietary supplements.			
3. I do not want to take dietary supplements.			
4. A balanced diet is more essential than dietary supplements			
5. I do not like dietary supplements			
6. I am not motivated to take dietary supplements.			

**c) Reasons for Taking Dietary Supplements.**

	Often	Seldom	Never
1. I excel in my sport when I take dietary supplements.			
2. Dietary supplements are worthwhile and necessary.			
3. Dietary supplements are enjoyable and stimulating.			
4. Dietary supplements are not important to everyday life.			
5. I take dietary supplements because I cannot afford a balance diet.			

**Appendix C: Rugby Teams Participating in 2006 Kenya Cup.**

Mean Machine

Impala

Mwamba

United States International University

Kenya Commercial Bank

Harlequins

Nondescripts

MINISTRY OF EDUCATION, SCIENCE & TECHNOLOGY

Telegrams: EDUCATION", Nairobi

Fax No.

Telephone: 318581

When replying please quote



REPUBLIC OF KENYA

JOGOO HOUSE  
HARAMBEE AVENUE  
P. O. Box 30040  
NAIROBI  
KENYA

**MOEST 13/001/35C 526/2**

**14<sup>th</sup> October, 2005**

**Elizabeth Mse  
Kenyatta University  
P.O. Box 43844  
NAIROBI**

Dear Madam

**RE: RESEARCH AUTHORIZATION**

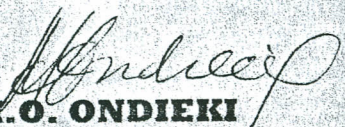
Please refer to your application for authority to conduct research on "Utilization of dietary supplements by Kenya Cup Rugby Players in the 2005 season".

This is to inform you that you have been authorized to carry out research among the teams taking parts in the Rugby seasons 2005 in Nairobi and Nakuru Districts for a period ending 30<sup>th</sup> March, 2006.

You are advised to report to The Provincial Commissioner, Nairobi, The Provincial Director of Education, Nairobi, The District Commissioner, Nairobi, The District Education Officer, Nairobi, The Principal Sports Officer, Nairobi and The District Sports Officer, Nakuru before commencing your study.

Upon completion of your research, you are expected to submit two copies of your research report to this office.

Yours faithfully

  
**M.O. ONDIEKI**  
**FOR: PERMANENT SECRETARY**