

**THE EFFECT OF REHABILITATION ON NUTRITIONAL STATUS OF  
ALCOHOL DEPENDENT MALES IN NAIROBI.**

**BY**

**EMMY C. LANG'AT**

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## DECLARATION

### Declaration by the Candidate

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Signature..... Date.....

**LANGAT CHERONO EMMY**

**SPH/PGH/11/10**

### Declaration by Supervisors

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

Signature..... Date.....

**DR. G. A. ETTYANG**

Senior lecturer,

Department of Epidemiology and Nutrition,

School of Public Health,

Moi University,

**Eldoret, Kenya**

Signature..... Date.....

**PROF. J. ROTICH**

Department of Epidemiology and Nutrition,

Moi University,

**Eldoret, Kenya**

## **DEDICATION**

This work is dedicated to my husband Paul Biegon and our lovely children Boaz and Michelle.

## ABSTRACT

**Background:** Habitual alcohol consumption leads to alcohol dependency which is associated with significant nutritional, medical, economical, and social risks. This has become a major public health issue globally both in developed and developing countries. Rehabilitation of alcohol dependent males requires emphasis not only on medical but also nutritional services which have been observed to increase a rapid and successful recovery process among rehabilitated alcohol dependent males. Adequate supply of nutrients is required to restore the nutritional deficiencies and help repair the damage done and strengthen the body's defense against diseases.

**Objective:** To determine the effect of rehabilitation on nutritional status of alcohol dependent males in Nairobi Place and Mathari hospital in Nairobi.

**Study site:** Nairobi is located 1°17'S 36°49'E, at 1,795 meters (5,889 ft) above sea level and occupies 696 km<sup>2</sup> (270 sq mi) in the south central of Kenya.

**Methodology:** Experimental (Pre-post) study design was used. A total of 57 rehabilitated alcohol dependent males in two sites viz; Nairobi Place and Mathari Hospital rehabilitation centers in Nairobi were recruited for the study within one week of admission and re-assessed after four weeks. Interviewer administered semi-structured questionnaires were used to collect data on social-demographic characteristics. A food frequency questionnaire was used to collect information on food consumed. A nutrient calculator was used to determine estimated nutrient intake. Anthropometric measurements of height and weight were taken using height board fitted with a tape measure and a digital scale respectively. Under-nutrition was determined based on body mass index (BMI) using a cut of <18.5 based on (weight (kgs)/height<sup>2</sup> (m)). Adequacy of nutrient intake was determined based on comparison with estimated average requirements (EAR) for the key selected nutrients. Risk factors independently associated with under-nutrition were compared using Chi-square test of association. T-test was used for continuous variables. Multivariate logistic regression was used to determine factors associated with under-nutrition adjusting for confounders. Data was analyzed using SPSS V.16.0 for windows and results were considered significant at 5%  $\alpha$ - level.

**Results:** The proportion of under-nutrition based on BMI before and after rehabilitation of respondents at Nairobi place was 10% and 5% respectively. There was no significant difference ( $\chi^2=0.604$ ,  $p=0.865$ ). Mathari had 16.2% and 8.1% underweight before and after rehabilitation respectively, the difference was not statistically significant ( $\chi^2=1.349$ ,  $p=0.592$ ). The findings in the first encounter showed that for Nairobi place and Mathari hospital, nutrient inadequacies were high in vitamin C at 80% and 61.9%; zinc at 67.4% and 79.8%; folate at 80% and 49.7% respectively. In the second encounter Nairobi place provided food that had adequate nutrients while Mathari hospital provided food that were inadequate in folate, Vitamin A and Vitamin C at probabilities of 100%, 100%, and 93% respectively. Socio-demographic characteristics and diseases were not significantly associated with under nutrition ( $p<0.05$ ).

**Conclusion:** The results of this study indicate that alcohol was the cause of under-nutrition in both centers as other factors were not significantly associated with under-nutrition. Rehabilitation play a role in the nutrition status and recovery of alcohol dependent males; it is recommended that the Government and program managers consider and emphasis nutrition in alcohol and drug rehabilitation programs.

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**LIST OF ABBREVIATIONS**

<b>AIDS</b>	Acquired Immunodeficiency Syndrome
<b>ALD</b>	Alcohol Liver Disease
<b>ARDI</b>	Alcohol Related Disease Impact
<b>BMI</b>	Body Mass Index
<b>CBD</b>	Central Business District
<b>CNS</b>	Central Nervous System
<b>EAR</b>	Estimated Average Requirement
<b>FFQ</b>	Food Frequency Questionnaire
<b>GIT</b>	Gastro-Intestinal Tract
<b>HIV</b>	Human Immunodeficiency Virus
<b>IREC</b>	Institutional Research and Ethical Committee.
<b>IU</b>	International Units
<b>NACADA</b>	National Campaign against Drug Abuse
<b>NHIF</b>	National hospital insurance fund
<b>NHS</b>	National Health Survey
<b>NIAAA</b>	National Institute on Alcohol Abuse and Alcoholism
<b>SPSS</b>	Statistical Package for Social Scientists
<b>PINI</b>	Prevalence of Inadequate Nutrient Intake
<b>UN</b>	United Nations
<b>WHO</b>	World Health Organization

## DEFINITION OF TERMS

**Acetaldehyde:** The first product of ethanol metabolism.

**Adequate diet:** Contains all nutrients necessary for long-term survival. It may not necessarily be optimal or have any variety.

**Alcohol:** Colorless volatile liquid, the most commonly ingested form is ethanol used the text to refer to both certified and illicit alcohol.

**Alcohol dependent males Anonymous (AA):** The original Twelve-Step recovery program, begun in 1935 by two alcohol dependent males to provide mutual help and support for people who have a desire to stop drinking.

**Alcohol dehydrogenase:** The main enzyme that catalyzes the conversion of ethanol to acetaldehyde.

**Alcohol dependency:** (Alcoholism) - Dependency on alcohol marked by compulsive uncontrolled drinking with negative effects on physical health, economic and social health.

**Antioxidant:** A substance that inhibits chemical oxidation.

**Bioavailability:** Refers to the difference between the amount of substance, such as drug or Herb, to which a person is exposed and actual dose of the substance the Body receives.

**Detoxification:** A process whereby a drug addicted person is withdrawn from the drug under chemotherapy.

**Macronutrients:** Nutrients needed by the body in large amounts for example carbohydrates and proteins.

**Micronutrients:** Nutrients needed by the body in little amounts for example Vitamins and Minerals.

**Nutritional Status:** The state of a person's health in terms of the nutrients in his/ her diet.

**National hospital insurance fund (NHIF):** is a state fund established in 1966 as a department under the ministry of health to collect contributions from Kenyans and pay hospital benefits out of the contributions to members and their declared dependents (spouse and children).

**Overweight:** BMI of more than 25

**Rehabilitation:** The process by which the alcohol dependent males are assisted in abstaining from drug abuse/dependency and in participating to achieve their optimal level of functioning.

**Underweight:** BMI of less than 18.5

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## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background information

The excessive use of alcohol is becoming a problem on a global scale, resulting in a variety of health and societal problems upsetting all walks of life (WHO, 2002). Approximately 2 billion (33%) people worldwide consume alcohol, and an estimated 76.2 million suffer from alcohol consumption disorders leading to approximately 3.2% global deaths (WHO, 2004). In Australia up to 67% of the years of life lost due to alcohol drinking (Government of South Australia, 2010). Excessive alcohol use is the 3rd leading lifestyle-related cause of death for people in the United States each year (ARDI tool- used to calculate alcohol attributed deaths, 2001–2005).

According to WHO, (2011) Kenya consumes by far the largest proportion of beer (44%) in East Africa region compared with average of 10.5% across the other four East Africa countries. The same applies to spirits/wines with 27% compared to 2% for the other four East Africa countries. In addition Kenya stands out again in consumption of homemade brew which in most cases goes unrecorded. Survey by National Campaign against Drug Abuse (2007 and 2009 a, b) indicates significant alcohol consumption in Kenya which shows an urgent need to prevent and control alcohol abuse in Kenya, the survey reported that an estimated 40% adults age of 15-65 years and 8% children aged 10 – 14 of its population to be abusing alcohol. According Nacada, (2012), Nairobi had the highest usage of packaged/legal alcohol (15.7%) followed by Central (9.2%). For home-made, Nairobi had the highest usage (7.2%) followed closely by Western (7.1%). Alcohol consumption is rampant and has claimed many lives, most conspicuous cases include the use of *kumi kumi* (illicit

liquor made from sorghum, maize or millet but contains methanol and is adulterated with car battery acid and formalin) in November 2000 which resulted in 140 deaths and lose of sight among some users in poor Nairobi neighborhoods (Mureithi, 2002).

Roe, (1985) associate alcohol with a myriad of physiological disruptions on the entire body, which brings to bare alcoholic effects like incontinence, impotence, memory loss, and liver damage among others. Most diseases that are designated as complications of alcoholism have been shown to associate with nutrient deficiency states and there has been hope that these troublesome symptoms associated with relapse might be amenable to nutrition therapy as several factors have operated together to encourage this line of investigation, which include similarity of nutrition deficiency and relapse-related symptoms of recovery, finding that food eaten can appreciable alter mood on rapid and long-term basis (Atkinson, 2009).The recognition that the use of CNS altering drugs in alcohol dependent males to be associated with increased relapse and/or suicide, consequences have rendered treatment of tension, mood swings and cravings for alcohol with tranquilizers and relaxants highly inadvisable and has increased the urgency for discovery of non-drug treatment (Lieber, 1980) which however, would only be possible if such efforts were backed by scientific evidence.

Due to limited data that relates to nutrition status of alcohol dependent males undergoing rehabilitation process in Kenya, this study will focus on nutritional factor, in particular dietary and anthropometrics of rehabilitated alcoholic males. Males will only be included in this study because it was noted that few or no females goes for residential rehabilitation services, and also to obtain a more homogeneous group.

## 1.2 Problem statement

Alcohol and drug abuse continue to be a significant problem in Kenya as well as other African countries with a compounded annual growth rate of 6.4% over the past years according to beer brewer SABMiller's 2009 annual report. According to WHO, (2011) Kenya consumes by far the largest proportion of beer, spirits/wines, homemade brew in East Africa region compared with the other four East Africa countries. Nairobi had the highest usage of packaged/legal alcohol and homemade brew when compared with other regions in Kenya (NACADA, 2012). National campaign against drug abuse (2007) survey showed that 5% of alcohol users had ever sought medical treatment for alcohol related ailments, 50% of alcohol users to have had ongoing craving for alcohol and 25% needed to consume it first thing in the morning. According to Shaffer *et al.*, (2004) 54% of patients reported hazardous drinking as measured by WHO AUDIT. Concern about drug and alcohol abuse in Kenya has grown in recent years due to massive incidences of blindness, death, low standard of education, poverty and deteriorating health conditions which directly affect consumers and the society at large, leading some to demand that the president and prime minister declare substance abuse a national disaster. In August 2010, Kenya's president, signed the Alcoholic Drinks Control Act 2010 and vowed to ensure that it would be enforced with more tenacity, underage drinking was officially outlawed and bar opening hours restricted so as to regulate the quality, quantity and the number of hours used in alcohol consumption.

Heavy alcohol drinking has long been regarded as having serious detrimental impact on nutritional status, and the degree of malnutrition correlates with the severity of

alcoholic liver disease (Griffith and Schenker, 2006) as well as there being the better known association with Wernicke–Korsakoff syndrome and is characterized by mental confusion and short-term memory loss due to thiamine deficiency (James and Ralph, 2000). Historically most drug and alcohol treatment programs have included counseling and 12-step approaches like Alcohol dependent males Anonymous (AA) which is a necessary part of a successful recovery program, these approaches alone have not been shown to be very effective as they address the psychological aspects of the disease without considering the physical aspects of the disease, studies have shown that AA has a success rate of about 25% (Larson, 1992). Unless the biochemical imbalances which are the true causes of substance problems are corrected, the benefits of psychological counseling will be marginal for most people. While traditional recovery programs do help many people across the world, some lesser-known integrated, holistic programs rooted in nutrition have reported great success. DesMaisons, (1996) reported 92 percent success rate in a nutritionally-based program with alcohol dependent males, While Larson, (1992) reported 70 percent recovery rate in a program which connected drug dependence with malnutrition and addressed common sugar sensitivities.

The cost of treatment at the alcohol and drug rehabilitation centers can be very expensive, especially for in-patient stays where one is required to take two to three months. Most Kenyans cannot afford the cost of residential treatment services, leaving them few treatment options. According to Nancy Ng'anga, (the head addiction counsellor in Mathari hospital), drugs are cheap and accessible but the treatment for addiction is not as it is still unlikely for the poor and slum dwellers to



visit the government centres which are cheap, She says that demand is high but the cost is what prevents people from going for rehabilitation services.

### **1.3 Justification of the study**

Alcohol and drug abuse poses a challenge to the progress of a nation since alcohol is known to have adverse effects on the quality of life and has implications for national productivity, security, and social-economic development (Blum *et al.*, 1993 and Randerson, 2007). Majority of the rehab centers mainly focuses on behavioral modification programs, therapies, medicines, motivational sessions and many more such treatments, and overlook one of the major aspects that need to be focused when dealing with drug addiction and that is Nutrition, It has been observed that when nutritional therapies are used as a combination with the traditional therapies improvements are rapid and successful (Larson, 1992 and Atkinson, 2009). Studies on nutrition and alcohol related outcomes have less considered the nutrition status of alcohol dependent males in rehabilitation centers which is the time when most alcohol consumers may be more receptive to an education on health and food (Barbadoro *et al.*, 2008) and at the time of treatment if the foodstuff that a patient consumes is not paid attention to properly, can have a great impact on the patient's health (Biery *et al.*, 1991), few studies have been conducted and documented on establishment of the use of nutrition therapy on treatment of rehabilitated alcohol dependent people in Kenya. This study was carried out in Nairobi place rehabilitation center which is a more expensive private institution and Mathari hospital rehabilitation unit which is a cheaper public institution in Nairobi.

This study hope to use the information to inform program managers on the interventions necessary to enhance their nutritional status through policy makers and

implementers', and later publish as a resource material for improvement of nutrition-based programs of alcohol rehabilitation in Kenya.

#### **1.4 Research questions**

- Does rehabilitation have effect on nutritional status of alcohol dependent males in Mathari and Nairobi Place rehabilitation center?
- What are the risk factors associated with under-nutrition among alcohol dependent males in Mathari and Nairobi Place?

#### **1.5 Objectives**

##### **1.5.1 General objective**

To assess the effect of rehabilitation on nutritional status of recovering alcohol dependent males in Nairobi Place and Mathari Hospital rehabilitation centers.

##### **1.5.2 Specific Objectives**

1. Determine the changes in proportion of under-nutrition among alcohol dependent males in Nairobi Place and Mathari Hospital rehabilitation centers.
2. Determine adequacy of Carbohydrate, Protein, Vitamin A and C, Thiamine, Folate and Zinc among the alcohol dependent males.
3. Identify risk factors associated with under-nutrition among alcohol dependent males in Nairobi Place and Mathari Hospital rehabilitation centers.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Chronic excessive alcohol consumption is well recognized for its effect on individual's nutritional status and its association with nutrient deficiencies and malnutrition (Gruchow *et al.*, 1985). Alcohol dependent males tend to have a poor diet, due to a disturbance in normal eating behaviour resulting in primary malnutrition and secondary malnutrition which occurs due to interference in the digestion, absorption, metabolism, and utilization of some nutrients (Santolaria and González-Reimers 2004).

#### **2.2 Effects of alcohol on Nutritional status**

All chronic alcohol dependent males suffer from some level of nutritional deficiencies (Graves, 1985) this is because they obtain most, if not all their daily energy requirements from ethanol, which although contains approximately 7 calories per gram has less biological value and contributes dramatically to the development of disease states of several organ systems which for many, the result is diminished utilization of oral nutrients that are necessary for normal health leading to the subsequent state of malnutrition (Lieber,1988).

Research indicates that the majority of even the heaviest drinkers have few detectable nutritional deficiencies but that many alcohol dependent males who are hospitalized for medical complications of alcoholism do experience severe malnutrition (Lieber, 1989), alcohol dependent males tend to eat poorly-often less than the amounts of food necessary to provide sufficient nutrients, the lack of appetite also makes it harder

to get needed nutrients (Gruchow et al., 1985), and a major concern is alcohol's effects on the digestion and utilization of nutrients which may shift a mildly malnourished person toward severe malnutrition.

Excessive use of alcohol causes mal-absorption and mal-digestion of various nutrients by damaging the cells lining the stomach and intestines thus decreasing the intestinal absorption of amino acids and various vitamins, particularly Thiamine, Folate, B6 and B12 (Mezey, 1991; Schenker and Halff, 1993). It also decreases secretion of digestive enzymes from the pancreas reducing absorption of fat and fat-soluble vitamins (A, D, E, and K) which are normally absorbed along with fats (Korsten, 1989). Altered fat metabolism in liver may propagate fibrosis by increasing collagen formation resulting in decreased stores of vitamins and carbohydrates (Schenker and Halff, 1993). These changes appear to reverse once the patient ceases drinking and starts to follow a normal diet, suggesting that nutritional replacement may be of special benefit in alcohol recovery (Mezey, 1991).

### **Proportion of under-nutrition among alcohol dependent males**

Koehn *et al.*, (1993) in their study on frequency of malnutrition in alcoholic inpatients where anthropometric data of hospitalized alcohol dependent males and non-alcohol dependent males were compared, found out that the average body weight of alcohol dependent males was normal, similar to the weight of non-alcoholic inpatients; however tricipital skin fold thickness was lower in alcohol dependent males than in non-alcohol dependent males ( $p=0.01$ ) in both males and females. Santolaria *et al.*, (2002) in Spain study reported basing on BMI that 12.5% were undernourished, 50% were normal, 30% over-weight, and 7% obese.

In a study by Nicolas *et al.*, (1993) on Nutrition status in chronically alcoholic men from the middle socioeconomic class 25 (10%) alcohol dependent males showed evidence of energy malnutrition, 15 (6%), of protein malnutrition and 6 (2%) of both. In the multivariate analysis, the only independent factors for the development of malnutrition were ethanol and liver cirrhosis ( $P < 0.01$ ). When patients with ethanol-related diseases were excluded, no significant differences in nutritional parameters were observed between chronic alcohol dependent males and controls. They concluded that malnutrition was not as frequent as previously thought in middle socioeconomic class alcohol dependent males and its existence may be considered as another consequence of ethanol intake or secondary to the alcohol-related diseases.

### **2.3 Role of adequate diet in recovery of alcohol dependent males**

A healthy diet plays an important role in alcoholic recovery since heavy alcohol consumption robs the body of vital nutrients. Improved diet along with vitamin and mineral supplements to restore the nutritional deficiencies for alcohol dependent males going through recovery is essential as healing happens faster than through normal practices (Lieber, 1989). Windham *et al.*, (1983) pilot study revealed that patients who received nutrition therapy reported significantly fewer hypoglycemic symptoms, lower sugar intake, less alcohol craving as well as significantly greater nutrient intakes; a greater number abstained from alcohol.

According to Werbach, (1993), Fishbein and Pease, (1988) in their human trials, hypoglycemia and other carbohydrate-metabolism health problems were best managed by taking meals at regular intervals, increasing proteins, reducing simple

carbohydrates and replacing them with more complex carbohydrates, this stabilized blood sugar throughout the day and led to a reduction in alcohol intake and craving.

Vitamin and mineral supplements typically are used at the start of the program until the body can re-adjust from all the imbalances and start absorbing nutrients effectively and the patient is able to take at least two well-balanced meals per day. Most programs supplement a good diet with amino acid supplements to promote good health and proper brain function (Ross, 1999).

Vitamin C appears to help the body rid itself of alcohol (Boyce *et al.*, 1990). Vitamins B complex, C, D, E, and folic acid can be restored with amounts found in standard multivitamins (Lieber *et al.*, 2003). According to Blum 1986, nutritional supplement leads to a significant reduction in withdrawal symptoms and decreases stress in alcohol dependent males compared to the effects of placebo.

Drug programs need to emphasize importance of health, particularly nutrition, educate about how it affects mind and body, how to shop for food and cook nutritious meals. According to research by Barbadoro *et al.*, (2008) before intervention, 19% of alcohol dependent rehabilitated individuals consumed 3meals/day. Following the educational intervention, 22.2% of participants improved their knowledge. After 6 months, when 45 patients agreed to a telephone interview of whom 80% reported continued abstinence of 70.7% reported eating more than 3meals/day. These findings indicate that nutrition therapy can aid in the recovery from alcoholism. Researchers have reported an increase alcohol intake when animals are fed nutrient-deficient diets or after stressful experience.

Posner *et al.*, (1986) examined the food purchases of former addicts and drug abusers living in a rehabilitation unit and found that there were low levels of vitamins, minerals, and fiber. Fat consumption was 51.6% compared to RD1 of 34% while protein was 7.5% compared to RD1 of 11%. Male patients would buy lots of white sugar, frozen chips, and few vegetables and no fruit was bought over 4 weeks (Fenton, 1990). Hurt *et al.*, (1981) found the mean of macronutrients carbohydrates, protein, and fat among the middle class alcohol dependent males before rehabilitation to be adequate and within the RDA allowance range; only 7% were found to be below the RDA. Hurt *et al.*, (1981) found that the percentages of patients with nutrient inadequacies were higher in micronutrients with vitamin A (38%), thiamin (34%), and ascorbic acid (28%). He also found that after the alcohol dependent males stopped drinking their mean intake of major nutrients increased significantly in Alcohol Dependence Unit than before admission; the most significant difference was in carbohydrates foods ( $p < 0.001$ ).

Chick, (1998) in his research found that adequate and balanced nutrition was commonly overlooked in well-meaning detoxification and recovery programs that were low or non-funded and treating the lower economic status clients. He noted lack of ability by many programs in provision of quality nutrients in sufficient quantities (or provide accessibility to these nutrients) to assist the client's recovery through the healing of tissue damage and neurotransmitter dysfunction and recommended that the means to deliver these nutrients, especially in the detoxification stages or early in recovery needed to be considered.

## **2.4 Risk factors associated with under-nutrition in alcoholism**

### **2.4.1 Diseases**

Poor utilization of nutrients brought about by inefficient metabolism or retention may be a consequence of alcohol-related diseases (James and Ralph, 2000). Lieber, (1989) associates increased alcohol intake along with poor nutritional protection to development of gastritis which is associated with deficiency of folate, thiamin, and vitamin B<sub>12</sub>.

Alcohol breakdown in the liver generate toxic products like acetaldehyde which is highly reactive and potentially damaging oxygen containing molecules which can interfere with normal metabolism of other nutrients, particularly lipids contributing to liver cell damage (Leo *et al.*, 1993). For example, vitamins B1 and B3 needed by the liver to metabolize alcohol are often in short supply. Folic acid's function in bone marrow to make red blood cells is diminished by alcohol. Thus, anemia may develop more easily with alcohol abuse, especially with low levels of vitamin B12 and reduced absorption and storage of iron and with liver impairment absorption of the fat-soluble vitamins are also reduced.

Prolonged drinking leads to thiamine deficiency which causes severe neurological and mental disorder (Hoyumpa, 1986). These patients require normal protein intake and vitamin supplements but forgetfulness may render such patients' abstinence from alcohol and appropriate food intake a particular challenge.

Research by Nicolas *et al.*, (1993) in his multivariate analysis, found that the risk factors for the development of malnutrition among the middle socio-economic class alcoholic men were the increase in alcohol intake and liver cirrhosis ( $p < 0.01$ ) which



affected nutrient intake, other factors were found to be non-significant. Mendenhall *et al.*, (1984) in his large study of hospitalized patients with varying severity of alcohol liver disease, found out that malnutrition especially caused by deficient protein and calories, was closely associated with the severity of liver injury. All patients with clinical evidence of ALD (regardless of severity) exhibited some features of malnutrition.

## CHAPTER THREE

### METHODOLOGY

#### 3.0 Introduction

This chapter describes the study area, design, population, sample size and sampling, data collection, management and analysis procedures.

#### 3.1 Study Area

This study was carried out in Nairobi between July to November 2012. Nairobi is the capital and largest city of Kenya which forms the Nairobi province. It is located  $1^{\circ}17'S$   $36^{\circ}49'E$ , at 1,795 meters (5,889 ft) above sea level and occupies 696  $km^2$  (270 sq mi) in the south central of Kenya. It has an estimated population of about 3,138,369 and a current growth rate of 6.9% according to the KNBS 2009 census. It is an international, regional, national, and local center for commerce, transport, regional cooperation, and economic development because of its facilities and its strategic position in the African continent. The city is a hub of road, rail, and air transport networks, connecting eastern, central, and southern African countries, and the potential for development is huge. Nairobi employs 25% of Kenyans and 43% of urban workers in the country, generating over 45% of national GDP thus being a major contributor to Kenya's economy (UN, 2006).

The huge gap between the poor masses and rich upper class remains. There are approximately 2.5 million slum dwellers of whom most of them live in extreme poverty, (Kenya National Bureau of Statistics 2009).The comparatively rich take highly taxed bottled beers while the poor go for cheap and affordable home made brew which sometimes lead to fatal results when laced with chemicals such as methanol.

With economics in play the government is challenged to stem Kenya's drinking culture as Kenya is self-sufficient in beer and barley and has remarkably invested in all the East African countries commanding the highest market share within the region. High excise duties charged on beer makes the sub-sector one of the main revenue earners for the government.

Nairobi has 18 drug rehabilitation centres among them are Mathari Hospital and Nairobi Place rehabilitation centres where this study was conducted. Mathari hospital drug unit is situated about 3kilometres to the North East of the Nairobi CBD in Muthaiga off Thika road, opposite Muthaiga police station. It is a governmental institution able to house 37 drug addicts at a time. It was established in 2003 in order to provide drug abuse treatment and rehabilitation services with the aim to become a centre of excellence for treatment, training, and research. The drug addicts' rehabilitation program takes three months (90 days) with first in, first out basis. Majority of the drug addicts are brought in the centre by their families, while a few come personally or brought by their communities for the rehabilitation services; then once admitted they are required to pay a deposit of Ksh5, 000, and a further Ksh200 per day (18,000Kshs) for the whole duration. For the ones without National Health Insurance Fund card they are charged Kshs 108,000 (Ksh1, 200 per day) for a three month course. During the first one month food from outside is not allowed for fear of introduction of drugs from outside. Clients are given a minimum of three meals a day.

Nairobi Place drug rehabilitation centre is situated 10 kilometers to the South West of Nairobi CBD along Lang'ata road and 2 kilometers off Langata Road along Mokoyeti Road West. It is a private institution able to house 20 patients. A number of

professionals are admitted for addiction to prescription drugs in the centre, Patients come from Europe and pan Africa countries to enrol at the Nairobi Place and follow the twelve (12) step Alcoholic Anonymous program, accredited globally as the most successful method in beating addiction. The aim of Nairobi Place was to successfully help people to return to a happier life, free from the compulsion to use alcohol and other mood-altering substances or behaviours. Patients or the family concerned are required to arrange with the administrator for rehabilitation services payment before admission is done. Like Mathari, majority of the drug addicts are brought in the centre by their families, while only a few come personally for the rehabilitation services; The Program is an individually tailored 6-week residential treatment with first in, first out basis in which they have the opportunity to regain their physical and psychological health through participating in individual and group cognitive behavioural therapy sessions. During the period food from outside is not allowed for fear of introduction of drugs from outside. Clients are given a minimum of three nutritious meals a day prepared by trained chefs.

The drug addicts in both centers are immediately subjected to holistic assessment processes by professional staff within 24 hours of admission. The treatment and rehabilitation programme describes structured daily and weekly activities, individual and group sessions, stages, or phases of treatment and related goals in a time defined programme.

The structured programme consists of:

- Medically monitored detoxification done by a qualified doctor and 24 hour nursing staff with medication where necessary.

- Psychiatric consultation determines if there are any psychiatric disorders that need to be treated along with their addiction so that the alcohol dependent males are equipped to fully participate in their treatment programs, Nairobi place rarely get such cases and if they do they are treated within the center, in Mathari psychiatric cases are referred to psychiatric ward where they are treated and upon being sober they are brought back to rehabilitation unit.
- Individual Psychotherapy with Psychologist helps the client treat their specific psychological needs for example anxiety and relapse prevention.
- In Group therapy, Clients support each other in group sessions, addressing issues around their addiction such as Denial, Powerlessness, and Damages.
- Organized group activities such as sport, health education (like HIV/AIDS), recreation and creative activities are carried out which spread throughout the week.
- Family support group- offers a supportive treatment group where family members learn about addiction and how it affects them.
- Art therapy- Is a relaxed and creative therapeutic technique that allows the clients to express themselves and their emotions, bringing them closer to emotions that have been numbed during active addiction.

In addition Mathari hospital drug rehabilitation center have:

- Clients being involved in non-exploitative work including vocational skills training activities for example cleaning of residential facilities as may be prescribed in the treatment programme meant to support clients' rehabilitation needs and individual treatment goals.
- Prior to discharge, clients and families are provided with information, life skills, support and counseling to assist with relapse prevention and

management and the centre links the clients to their original referral and any other community resource for example social workers and self-help groups.

Nairobi Place has in addition;

- Athletics (jogging) which are normally done in the morning before beginning of daily programme.
- Written assignments- Are completed by all patients around a range of topics such as Guilt and Shame, Powerlessness, Unmanageability, Gratitude.
- Relapse prevention- It is crucial that clients understand how to face this pressure and maintain their sobriety outside residential rehabilitation centre since they cannot expect to be followed up after rehabilitation.

### **3.2 Study Population**

According to statistics in 2010, Mathari hospital drug unit admitted a total of 137 males and 7 females of whom 100 males and 7 females were alcohol abusers. Nairobi Place on the other hand admits a range of 50-90 addicts per year of whom females constitute less than 20% among them about 90% are alcohol abusers. Due to low admission rates per year in the two centers, the study was carried out on 57 rehabilitated alcohol dependent males in Nairobi Place and Mathari hospital rehabilitation centres. This was the total number of rehabilitated alcohol dependent males that the two institutions could house per session before others are admitted, In this case 57 was the target population because that was the total number of alcohol dependent males both centers were able to house within a month. Two health workers, Nutritionist in Mathari Hospital and a Psychiatrist in Nairobi place were recruited for the study.

### **3.3 Study Design**

An experimental (pre-post) study was used to study the target population (within one week and after one month in rehabilitation).

### **3.4 Sample size determination**

Since the total number of subjects in study period was 57 all the subjects were studied.

### **3.5 Sampling technique**

All consented subjects within one week of rehabilitation in the two centers were recruited immediately after IREC approval and continued until sample size of 37 in Mathari Hospital and 20 in Nairobi Place rehabilitation centre were attained. Interview administered questionnaires were used to collect data from the respondents. At the start of the study, all the subjects who had been in the centre for less than seven (7) days were recruited and interviewed. These subjects were identified from the drug unit admission records. The number of subjects to be interviewed per day for the rehabilitated alcohol dependent males, who were already in rehab centers when research begun, depended on the centre's program and the subjects' availability at the time of the interview. For the other respondents, the number to be interviewed per day was determined by the rate of admission per day. Purposive sampling was used to recruit two health workers (Nutritionist at Mathari and Psychiatrist from Nairobi Place) who participated in the study; they were interviewed after the entire sample size of the subjects was attained because they were not affected by timeframe like the subjects.

### **3.5.1 Inclusion criteria**

All adult alcohol dependent males who were admitted not more than 7 days prior to start of the study and those who gave consent were included in the study.

### **3.5.2 Exclusion criteria.**

Alcohol dependent males with active psychotic symptoms.

## **3.6 Data Collection Tool**

### **3.6.1 Questionnaires**

An interviewer administered questionnaire was used to collect data on socio-demographic characteristics such as education level, age, marital status, religion, and occupation. The questionnaire was also used to collect information such as dietary intake and disease symptoms from the alcohol dependent males and used to determine the relationship between socio-demographic factors and nutritional status.

## **3.7 Data Collection Procedures**

There are four methods used in assessment of nutrition status; Clinical method, Nutritional anthropometry, biochemical tests and dietary assessment (Shubhangini, 2002), in this study only anthropometric and dietary assessment were used.

### **3.7.1 Anthropometric measurements**

Basing on (Shubhangini, 2002), measurements used to determine under-nutrition were height and weight which were taken within one week of admission and after four weeks. Digital scale was used to measure weights of the subjects, the scale was turned on and waited until zero showed up, shoes and heavy clothes that interfered with



weight were removed and the individual asked to stand on the scale. Measurements were recorded to the nearest 0.1 kg.

A wooden height board fitted with a tape measuring to the nearest 0.1 cm was used to measure heights of the subjects; anything that was likely to interfere with height measurement was removed like shoes and caps. The individual was asked to stand on the footboard with legs slightly apart, the back of the head, shoulder blades, buttocks, calves and heels touched the vertical board, the headboard was pulled down until it rested firmly on top of the head. The measurement was read and recorded in centimeters.

### **3.7.2 Nutrient intake assessment**

The Food frequency questionnaire was used to collect data on nutrient intake of individuals, a complete list of foods and beverages consumed during specified time (monthly) was prepared by the researcher to fit the foods found in study area. The number of times each food item was consumed; recording was done in the appropriate box (see appendix 3). The size of portion eaten was estimated using pictures (see appendix 5). The estimated weight of food eaten were entered into a nutrient calculator, a computer based calculator locally developed using Microsoft Access program based on Kenya Food Composition Tables (Sehmli, 1993).

### **3.8 Data Management and Analysis**

Completed questionnaires were coded by the researcher and then data analyzed using SPSS version 16.0 statistical package. Calculation of BMI as  $\text{weight}(\text{kg})/\text{height}^2(\text{m})$ , classified the subjects as undernourished when BMI was less than  $18.5 \text{ kg/m}^2$ , normal at  $18.5\text{--}24.9 \text{ kg/m}^2$ , overweight at  $25\text{--}29.9 \text{ kg/m}^2$  and obese if more than  $30 \text{ kg/m}^2$ .

The contents of Food frequency questionnaires were entered into a nutrient calculator to determine estimated nutrient intake of the key selected nutrients Carbohydrates, Protein, Thiamine, Folate, Vitamin A, C, and Zinc of each individual. The quantities were then compared with Estimated Average Requirement (EAR) for each nutrient (Rosolid, 1990) to determine nutrient adequacy or inadequacy among the subjects. Nutrient adequacy ratio (%) of the EAR an individual consumed was determined by; taking the amount of each nutrient consumed by an individual, divided by the EAR of same food multiplied by 100. The probability approach to estimate the proportion of inadequate intakes was used. Nutrient intakes were classified into six classes as individual's intake in terms of percent estimated average requirement (EAR); (Appendix 5: Row A). The number of individuals with intakes of the nutrient within each class was determined. This number was then multiplied by the appropriate probability for each class (Appendix 5: Row B) to give the number of individuals per class who were likely to have intakes below their own EAR. The sum of these numbers gives the total number of individuals in the population who are at risk for inadequate intakes of the nutrient expressed as a percentage. (Example: carbohydrate intake of an individual was 50g. The probability will be calculated as  $50g / \text{EAR for CHO} (100) * 100$ , 50% will be <54 and the probability inadequacy will be 1 or 100%). One sample t-test was used to compare the nutrient intake and Estimated Average Requirements.

During the first encounter dietary intake information was from foods taken by the subjects for the last one month before being admitted in the rehabilitation centres while in the second encounter, dietary intake information was from the foods they were given in the rehabilitation centres which were standard for all the patients.

Risk factors independently associated with nutrition status were compared using Chi-square test of association. Results were considered significant at 5%  $\alpha$  level. Qualitative data obtained from interview was coded and frequencies generated.

### **3.9 Variables of Study**

#### **3.9.1 Independent Variables**

Social demographic characteristics included education, marital status, and occupation; Individual factors included Age, weight, diseases prior the study and Dietary intake includes Carbohydrate, protein, thiamine, vitamin A and C, folate and zinc.

#### **3.9.2 Dependent Variables**

Under-nutritional based on BMI.

### **3.10 Validity and reliability of the study instrument**

#### **3.10.1 Validity of the research instrument**

Validity is the quality attributed to measures of the degree to which they conform to the established knowledge. It refers to the extent to which an instrument asks the right questions in terms of accuracy (Mugenda, 1999). The face validity of the research instruments, questionnaires, and interview schedule was established by presenting them to the experts in the department of Nutrition Moi University school of Public Health for their input which was included in the final draft.

#### **3.10.2 Reliability of the research instrument**

This refers to the measure of the degree to which a research instrument yields consistent results after various repeated trials. The reliability of the instrument was established through a pilot study in Nairobi Outreach Services- NOSET Maisha

House rehabilitation centre in Nairobi on 6 males (10%) of the study sample (Mugenda, 1999). The pilot study exposed some weaknesses in the interview schedule like unclear and repetitive questions, which were addressed.

### **3.11 Limitations of the study**

The scope of the study was limited to only two centers in Nairobi, a private (expensive) and a governmental (cheaper) rehabilitation center.

- Food frequency dietary intake was based on participants' memory and perception.
- Re-assessment was done after one month, the period which food from outside was not allowed in the rehabilitation centers.
- Time and financial constraints limited the study from using other nutritional assessment methods like bio-chemical and visiting other rehabilitation centers in Nairobi and other parts of the country.

### **3.12 Ethical Considerations**

Presentation of proposal to School of Public Health (SPH) and Moi University and Moi Teaching and Referral Hospital IREC for approval before commencement of the study. Permission was obtained from the Heads of rehabilitation centres where research was conducted. Informed consent was obtained from the rehabilitated alcohol dependent males after explaining to them what the research study was all about. A research Assistant was trained on data collection and on how to treat all the participants with respect and confidentiality (coded numbers on the questionnaire

were used instead of names). Participants were allowed to withdraw any time from the study if they were not able to continue due to one reason or another. The questionnaires were administered together with anthropometric measurements in privacy.

## CHAPTER FOUR

### RESULTS

#### 4.1 Introduction

This chapter presents the results obtained from the study.

#### 4.2 General characteristics of the study subjects

A total of 57 rehabilitated alcohol dependent males participated in the study. Mathari constituted 37(64.9%) of the respondents with mean age (in years) of 34.2 ( $\pm 8.3$ ) and age range of 20-53 years. Nairobi place had the mean age of 34.6( $\pm 9.1$ ) with age range of 21-51 years. More than half 30(53.6%) of the respondents were single and 15(26.8%) were married. Majority 36(64.3%) had tertiary level of education with half the population being permanently employed.

**Table 4.1: Demographic characteristics of the respondents**

Characteristic	Mathari Frequency (%)	Nairobi place Frequency (%)	Total Frequency (%)
<b>Religion</b>			
Protestant	19 (51.4)	6 (35.3)	25 (46.3)
Catholic	18 (48.6)	8 (47.1)	26 (48.1)
Others	0 (0)	3 (17.6)	3 (5.6)
<b>Marital status</b>			
Single	21 (56.8)	9 (47.4)	30 (53.6)
Married	11 (29.7)	4 (21.1)	15 (26.8)
Divorced/ Widowed	5 (13.5)	6 (31.6)	11 (19.6)
<b>Education level</b>			
Primary	1 (2.7)	0 (0)	1 (1.8)
Secondary	15 (40.5)	4 (21.1)	19 (33.9)
Tertiary	21 (56.8)	15 (78.9)	36 (64.3)
<b>Employment status</b>			
Employed	20 (54.1)	8 (42.1)	28 (50)
Unemployed	17 (45.9)	11 (57.9)	28 (50)
<b>Income per month (Kshs)(employed)</b>			
>20000	20 (100)	7 (87.5)	27 (100)

Majority 23 (62.2%) of the respondents at Mathari consumed both homemade and factory made type of alcohol, 18 (48.6%), 14(37.8%) and 5(13.5%) of respondents had been drinking for a period of > 10, 5-10 and <5 years respectively. More than half 11(55%) of participants at Nairobi place had consumed factory made alcohol for a period of between 5-10 years, while 8(40%) and 1(5%) had consumed alcohol for >10 and <5 years respectively.

Nairobi place had equal percentage of 2(10%) in stomach ulcers, liver cirrhosis, and bleeding gums/nose on entry to the rehabilitation center. Mathari had 6(16.2%) stomach ulcers and 2(5.4%) diarrhea as shown in table 4.2 below

**Table 4.2: Other characteristics of the respondents**

<b>Characteristic</b>	<b>Mathari Frequency (%)</b>	<b>Nairobi place Frequency (%)</b>	<b>Total Frequency (%)</b>
<b>Drinking duration(yrs)</b>			
<b>&lt;5</b>	5 (13.5)	1 (5)	6 (10.5)
<b>5-10</b>	14 (37.8)	11 (55)	25 (43.9)
<b>&gt;10</b>	18 (48.6)	8 (40)	26 (45.6)
<b>Type of Alcohol</b>			
<b>Homemade</b>	5 (13.5)	6(30)	11 (19.3)
<b>Factory made</b>	9 (24.3)	11(55)	20 (35.1)
<b>Both</b>	23 (62.2)	3 (15)	26 (45.6)
<b>Medical problems</b>			
<b>Stomach ulcers</b>	6 (16.2)	2 (10)	8 (14)
<b>Liver cirrhosis</b>	1 (2.7)	2 (10)	3 (5.3)
<b>Diarrhea</b>	2 (5.4)	0	2 (3.5)
<b>Bleeding gums/nose</b>	2 (5.4)	2 (10)	4 (7)

Among the 6(30%) of the respondents that had medical problems in Nairobi Place, 6(100%) reported an improvement. At Mathari the 11(29.7%) who had medical problems, 7(63.6%) reported improvement and 4(36.4 %) reported no difference.

### 4.3 Proportion of Under-nutrition based on BMI

Among respondents at Mathari, 6(16.2%) were underweight before while only 3(8.1%) were underweight after one month rehabilitation ( $\chi^2= 1.349$ ,  $p=0.591$ ) as indicated in figure 4.3

Before rehabilitation, 2(10.0%) of the respondents at Nairobi place were underweight, but after rehabilitation, only 1(5%) were found to be underweight. The difference was not statistically significant ( $\chi^2 =0.604$ ,  $p=0.865$ ).

**Table 4.3: Proportion of Under nutrition based on BMI at Mathari and Nairobi Place**

Mathari	BMI	Before	after	$\chi^2$	P-value
	<18.5	6 (16.2)	3(8.1)	1.349	0.591
	18.5-24.9	27 (73)	28(75.7)		
	25-29.9	4 (10.8)	6(16.2)		
Nairobi Place	<18.5	2 (10)	1 (5)	0.604	0.865
	18.5-24.9	15 (75)	17 (85)		
	25-29.9	3 (15)	2 (10)		

### 4.4 Adequacy of nutrient intake compared to Estimated Average Requirement

The probability approach was used to estimate the Proportion of inadequate intakes based on EAR. However, this approach is not applicable to interpretation of energy and fats intake. Table 4.2 indicates that among the rehabilitated alcohol dependent males at Mathari, inadequate nutrient intake were high in micronutrients with zinc, vitamin C and folate having 79.8%, 61.9% and 49.7% respectively, protein had high inadequacy in macronutrients with 37.5%. Folate and zinc were significantly below EAR while carbohydrate was significantly above EAR ( $p<0.05$ ).



In the final encounter Mathari provided, Carbohydrates, Protein, Zinc and vitamin B1 nutrients on average that were significantly higher than EAR ( $P < 0.05$ ). Vitamin A, C and Folate intake were significantly below EAR ( $p < 0.05$ ). The probability of inadequacy in nutrient intake was highest in Vitamin A and Folate since all the patients were inadequate followed by Vitamin C with 93%.

**Table 4.4: Adequacy of Nutrients intake in Mathari**

Mathari Hospital							
Nutrient	First encounter				Second encounter		
	EAR	Mean (sd)	%PINI	P-value	Mean	%PINI	P-value
Carbohydrates(g)	100	387.0 (439)	2.7	<0.001	841.9	0	<0.001
Protein(g)	46	50.2 (32.4)	37.5	0.437	146.6	0	0.001
Vitamin A( $\mu$ g)	625	817.4 (857.6)	40.9	0.181	278.2	100	<0.001
Folate( $\mu$ g)	320	90.4 (110.3)	49.7	<0.001	137.4	100	<0.001
Zinc(mg)	9.4	5.6 (2.7)	79.8	<0.001	20.3	0	0.013
Vitamin B1(mg)	1.0	1.1 (0.7)	29.9	0.253	4.4	0	<0.001
Vitamin C(mg)	75	61.9 (61.4)	61.9	0.201	43.3	93	0.047

**NOTE:** EAR is Estimated Average Requirement, % PINI is Prevalence of Inadequate Nutrient Intake.

Comparison between the means of selected nutrients during the first and the second encounter showed that all the nutrients increased significantly apart from Vitamin A and C which reduced significantly ( $p < 0.001$ ), folate however increased during the second encounter but was still significantly below EAR.

**Table 4.5: Difference in the means between the first and second encounter**

<b>Mathari</b>			
	<b>Before</b>	<b>After</b>	
<b>Nutrient</b>	Mean (sd)	Mean	P-value
<b>Carbohydrates(g)</b>	387.0 (439)	841.9	<0.001
<b>Protein(g)</b>	50.2 (32.4)	146.6	0.001
<b>Vitamin A(µg)</b>	817.4 (857.6)	278.2	<0.001
<b>Folate(µg)</b>	90.4 (110.3)	137.4	0.001
<b>Zinc(mg)</b>	5.6 (2.7)	20.3	0.001
<b>Vitamin B1(mg)</b>	1.1 (0.7)	4.4	<0.001
<b>Vitamin C(mg)</b>	61.9 (61.4)	43.3	0.034

As indicated in table 4.6, during the first encounter at Nairobi Place vitamin C, zinc, and folate intakes were significantly below EAR ( $p < 0.05$ ). Carbohydrate was significantly above EAR. Nutrients inadequacy levels were high in micronutrients with folate, vitamin C, zinc, and vitamin A with 80%, 80%, 67.4%, and 50% respectively.

During the second encounter Nairobi Place provided foods that were adequate in all nutrients. All selected nutrients were significantly above EAR ( $p < 0.001$ ) hence there were no probability of nutrient inadequacies as shown below.

As shown in table 4.7, comparison between the means of nutrients during the first and the second encounter at Nairobi Place showed significantly increase.

**Table 4.6: Adequacy of Nutrients intake in Nairobi Place**

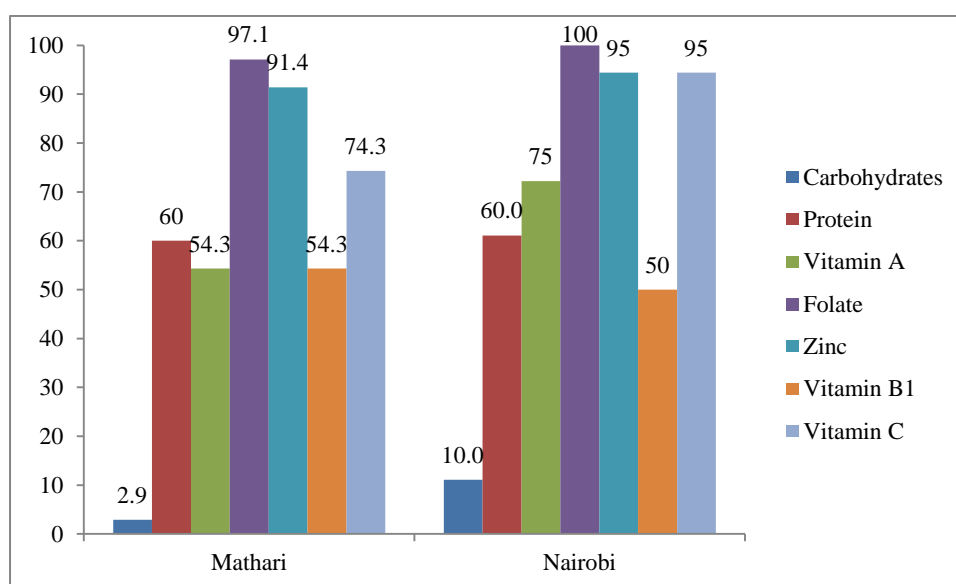
Nairobi Place							
Nutrient	First encounter				Second encounter		
	EAR	Mean (sd)	%PINI	P-value	Mean	%PINI	P-value
<b>Carbohydrates(g)</b>	100	287.7 (152.3)	5	<0.001	1791	0	<0.001
<b>Protein(g)</b>	46	47.7 (32.8)	37.4	0.827	165.0	0	<0.001
<b>Vitamin A(µg)</b>	625	475.2 (381.5)	50	0.114	2132.4	0	<0.001
<b>Folate(µg)</b>	320	92.3 (95)	80	<0.001	661.3	0	<0.001
<b>Zinc(mg)</b>	9.4	5.3 (2.5)	67.4	<0.001	29.9	0	<0.001
<b>VitaminB1 (mg)</b>	1.0	1.1 (0.5)	25	0.514	4.2	0	<0.001
<b>Vitamin C(mg)</b>	75	36.7 (24.9)	80	<0.001	120.6	0	<0.001

**NOTE:** EAR is Estimated Average Requirement, % PINI is Prevalence of Inadequate Nutrient Intake.

**Table 4.7: Difference in means between the first and second encounter**

Nairobi Place			
Nutrient	Before	After	P-value
	Mean (sd)	Mean	
<b>Carbohydrates(g)</b>	287.7 (152.3)	1791	<0.001
<b>Protein(g)</b>	47.7 (32.8)	165.0	<0.001
<b>Vitamin A(µg)</b>	475.2 (381.5)	2132.4	<0.001
<b>Folate(µg)</b>	92.3 (95)	661.3	<0.001
<b>Zinc(mg)</b>	5.3 (2.5)	29.9	<0.001
<b>Vitamin B1(mg)</b>	1.1 (0.5)	4.2	<0.001
<b>Vitamin C(mg)</b>	36.7 (24.9)	120.6	<0.001

As indicated in fig 4.1, 20(100%) of respondents at Nairobi place had inadequate intake of folate, 19(95%) vitamin C and Zinc, at Mathari, 34(97.1%) had inadequate intake of Folate and 32(91.4%) zinc. There was no significant difference in the proportion of inadequate intake of nutrients between the two study sites ( $p>0.05$ ) as shown in table 4.8.



**Figure 4.1**Percentage inadequate nutrient intake by site:

**Table 4.8: Differences in proportion of inadequate nutrient intake by study site (1st encounter)**

Nutrient	Mathari (%)	Nairobi place (%)	P-value
<b>Carbohydrates(g)</b>	1 (2.9)	2 (10)	0.263*
<b>Protein(g)</b>	21 (60)	12 (60)	0.938
<b>Vitamin A(μg)</b>	19 (54.3)	14 (70)	0.206
<b>Folate (μg)</b>	34 (97.1)	20 (100)	1.000*
<b>Zinc (mg)</b>	32 (91.4)	18 (90)	1.000*
<b>Vitamin B1(mg)</b>	19 (54.3)	10 (50)	0.767
<b>Vitamin C(mg)</b>	26 (74.3)	19 (95)	0.137

\* Fisher's exact chi-square

#### 4.5 Under-nutrition and Risk Factors

As indicated in table 4.9, there was no significant relationship between age, religion, marital status, education level and employment and under-nutrition ( $p>0.05$ ).

**Table 4.9: Socio-demographics and under-nutrition**

MATHARI			
Factor	Mean age	t-value	P-value
Undernourished			
Yes	33.8(8.9)	0.113	0.911
No	34.3(8.3)		
NAIROBI PLACE			
Undernourished			
Yes	36(4.2)	0.219	0.829
No	34.5(9.5)		

<b>MATHARI</b>				
<b>Factor</b>	<b>Under-nourished</b>		$\chi^2$	<b>p-value</b>
	<b>No</b>	<b>Yes</b>		
<b>Religion</b>				
<b>Protestant</b>	16(84.2)	3(15.8)	0.414	0.813*
<b>Catholic</b>	15(66.7)	3(33.3)		
<b>Marital status</b>				
<b>Single</b>	16(76.2)	5(23.8)	1.556	0.559*
<b>Married</b>	10(90.9)	1(9.1)		
<b>Divorced/ Widowed</b>	5(100)	0		
<b>Educational level</b>				
<b>Primary</b>	1(100)	0(0)	0.867	0.730*
<b>Secondary</b>	12(80)	3(20)		
<b>Tertiary</b>	18(85.7)	3(14.3)		
<b>Employment status</b>				
<b>Employment</b>	16(80)	4(20)	0.459	0.667*
<b>Unemployment</b>	15(88.2)	2(11.8)		
<b>NAIROBI PLACE</b>				
<b>Religion</b>				
<b>Protestant</b>	6(100)	0	1.419	0.719*
<b>Catholic</b>	7(85.5)	1(12.5)		
<b>Others</b>	2 (66.7)	1(33.3)		
<b>Marital status</b>				
<b>Single</b>	9(100)	0	2.546	0.263*
<b>Married</b>	3(75)	1(25)		
<b>Divorced/ Widowed</b>	5(83.3)	1(16.7)		
<b>Educational level</b>				
<b>Secondary</b>	3(75)	1(25)	1.127	0.836*
<b>Tertiary</b>	14(93.3)	1(6.7)		
<b>Employment status</b>				
<b>Employment</b>	8(100)	0	1.626	0.485*
<b>Unemployment</b>	9(81.8)	2(18.2)		

\*Fishers exact chi square

#### 4.6 Results from Health worker (Nutritionist)

Both the nutritionist and the psychiatrist were females and had University education and had worked in their current profession for more than 5 years. They all had undergone professional training. The nutritionist at Mathari was aged 35 years and.

She was of the opinion that the rehabilitation centre does not provide enough and adequate nutrition interventions for the rehabilitation services due to inadequate funds. She reported that the centre provides nutrition education with emphasis on balanced diet and micro-nutrient supplementation. Dietary management was done through counseling. With regards to availability of food and supplements, only Vitamin A, cabbages, and beans were reported to be adequately available. Animal protein, fruits, dark green leafy vegetables were reported to be not available.

At Nairobi place the psychiatrist was aged 38 years and was of the opinion that the rehabilitation centre provides enough and adequate nutrition interventions for rehabilitation services because they had qualified chefs/ nutritionist and also the cost of rehabilitation services was enough to cater for nutrition services as well as other services. The center also provides nutrition education with emphasis on Healthy eating/balanced food. Supplementation and dietary management are also emphasized. All the types of foods (carbohydrates, proteins, vegetables, fruits, supplements) were reported to be adequately available including also nutrition counseling by trained staff.

## CHAPTER FIVE

### DISCUSSION

#### **5.1 Proportion of under-nutrition among the alcohol dependent males**

The results of this study showed that the proportion of under-nutrition based on BMI before and after rehabilitation at Mathari was 16.2% and 8.1% and at Nairobi place 10% and 5% respectively. The difference was not statistically significant. This is in agreement with the research done by Santolaria *et al.*, (2002) who found out 12.5% among the alcohol dependent males to be undernourished based on BMI. This may be attributed to poor dietary intake especially macronutrients prior to discontinuing alcohol use, since alcohol displaces fats and carbohydrates as a source of energy due to its high energy content with less biological values which agrees with research that was conducted by Lieber, (1989) and Gentala, (1979).

#### **5.2 Adequacy of Nutrient intake**

Proper intake of oral nutrition including proteins, carbohydrates, fats, vitamins, minerals, and water is the absolute basic of human health and mental well-being, and the fact that all chronic alcohol dependent males suffer from some level of nutritional deficiencies (Graves, 1985), is in agreement with this research as there were similar trends in nutrient inadequacies in both centers during the first encounter (before rehabilitation). There is need to deliver these nutrients, especially in the detoxification stages or early in recovery to avoid discomfort which for many lead to relapse.

The key nutrients selected for evaluation were carbohydrates, proteins, Vitamin A, C, B1, folate, and zinc. The findings in the first encounter showed macronutrients, carbohydrates and protein were above the EAR with carbohydrate significantly higher



in both centers. For micronutrients, folate and zinc were significantly below EAR in both rehabilitation centers. In addition Nairobi Place had Vitamin C significantly below EAR. Micronutrients appeared to be highly inadequate in both centers than the macronutrients. Zinc was highly inadequate with 79.8%, followed by Vitamin C and Folate with 61.9% and 37.5% respectively in Mathari. In Nairobi Place, Folate and Vitamin A were highly inadequate with 80%, followed by zinc 67.4%.

In the second encounter (after one month), the intake of macronutrients (carbohydrates and protein) increased significantly ( $p < 0.001$ ) during treatment period than before as there were no inadequacies in both centers. Mathari hospital had higher inadequacies in Folate and Vitamin A where all patients were inadequate, Vitamin C had 93% inadequacy; these nutrients were significantly below EAR. Nairobi place provided nutrients that were significantly above EAR and there were no nutrient inadequacies. Even though these results used EAR, it is consistent with results from Hurt *et al.* (1981) who found the mean of macronutrients carbohydrates, protein, and fat among the middle class alcohol dependent males before rehabilitation to be adequate and within the RDA allowance range; only 7% were found to be below the RDA. Hurt *et al.* (1981) found that the percentages of patients with nutrient inadequacies were higher in micronutrients with vitamin A (38%), thiamin (34%), and ascorbic acid (28%). He also found that after the alcohol dependent males stopped drinking their mean intake of major nutrients increased significantly in Alcohol Dependence Unit than before admission; the most significant difference was in carbohydrates foods ( $p < 0.001$ ).

The results of this study showed that there is low provision of balanced nutrients in sufficient quantities in Mathari (Public) hospital where vitamin A, C and Folate were significantly below EAR, the low levels may have been contributed by the lack of provision of fruits, dark green leafy vegetables, and animal proteins at the hospital. The nutritionist at Mathari pointed out that vitamin A supplements were given to all drug addicts on admission to cater for vitamin A deficiencies that was common among them. She was of the opinion that the rehabilitation centre does not provide enough and adequate nutrition interventions for the rehabilitation services due to inadequate funds. This is in agreement with (Chick, 1998) who found out that adequate and balanced nutrition was commonly overlooked in detoxification and recovery programs which received low or no funding especially treating the lower economic status clients.

### **5.3 Factors associated with under-nutrition**

The results from this study indicated that there was no significant relationship between age, religion, marital status, education level, employment and diseases with under-nutrition ( $p > 0.05$ ). These results agrees with research that was done by Nicolas *et al.*, (1993) apart from liver cirrhosis in his multivariate analysis, that the risk factors for the development of malnutrition were the increase in alcohol intake and liver cirrhosis which affected nutrient intake since other factors were found to be non-significant. He concludes that malnutrition is not as frequent as previously thought in middle socioeconomic class alcohol dependent males and its existence may be considered as another consequence of ethanol intake or secondary to the alcohol-related diseases. Similar findings were observed by Hillers and Massey, (1985) that as alcohol consumption increases, the percentage of energy derived from protein, fat,

and carbohydrate decreases and the nutritional quality of the diet declines causing primary and secondary malnutrition.

Nicolas *et al.*, (1993) findings that Alcohol liver disease was significantly associated with under-nutrition ( $p < 0.01$ ) contradicted with results from this research since diseases including ALD were not significantly associated with under-nutrition, this could be due to difference in sample size.

## CHAPTER SIX

### CONCLUSION AND RECOMMENDATIONS

#### 6.1 Conclusion

- The proportion of under-nutrition was lower after rehabilitation than before in both rehabilitation centers.
- The results of this study indicate that a higher percentage of alcohol dependent males in both rehabilitation centers met or exceeded the nutrient requirement in macronutrients as redefined by EAR.
- Nutrients that were inadequate before rehabilitation included; Zinc as highly inadequate 79.8%, Vitamin C 61.9% and Folate 37.5% in Mathari drug unit. Nairobi Place had higher inadequacies in folate and vitamin C with 80% each followed by zinc with 67.4%.
- Low provision of Folate, Vitamin A and C nutrients in Mathari Hospital drug unit. The probability of inadequacy was 100% in both folate and Vitamin A with vitamin C having 93%.
- Under-nutrition could be attributed to alcoholism in the two centers since other factors were not significantly associated with under-nutrition in this study.

#### 6.2 Recommendations

- Multivitamin supplementation in Mathari Hospital drug unit.
- Therapists should encourage quality dietary intake and eating at regular times.
- The ministry of health needs to consider Nutrition services in treatment of alcohol and drug addiction and organize seminars for Nutritionists and medical officers in drug rehabilitation centres.

- The Government with the ministry of health needs to increase the number of public drug rehabilitation centers across the country and subsidize the cost of drug rehabilitation services for the low economic status addicts to afford and benefit from the services.
- Further longitudinal study should be conducted on biochemical nutrition status of alcohol dependent males before and after rehabilitation in Kenya

### **6.3 Dissemination of the findings**

A written report will be submitted to Mathari hospital, Nairobi Place rehabilitation center, school of Public Health, Ministry of Health to enhance relevant actions in terms of interventions. The document will be published in the peer review channels and presented in the conferences.

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## APPENDICES

### APPENDIX 1: CONSENT FORM

**Title: The effect of rehabilitation on Nutritional status of alcohol dependent males in Nairobi.**

**Researcher: Emmy Cheron Lang'at**

**School of Public Health**

**P.o Box 4606, Eldoret**

**The purpose and Back ground:** This study intends to determine the effect of rehabilitation on the nutritional status of rehabilitated alcohol dependent males in a governmental and a private rehabilitation centre's in Nairobi.

**Procedure:** Pre-post study will be conducted in the two centers, Nairobi Place and Mathari hospital rehabilitation centers. You will be given a questionnaire that will take a short time to fill.

**Benefits and Risks:** The respondents will gain knowledge on healthy food choices. There will be no risk involved in this research.

**Confidentiality:** All information given in this study will be considered confidential and will only be used for the study purpose.

**Voluntary Participation:** The participation in this study is entirely voluntary and participants are free to accept or refuse to take part in the study or withdraw anytime from the study.

**Consent:** I have read/heard the nature of the study and voluntarily agree to participate in the study.

Signature of the respondent ..... Date.....

Signature of the interviewer..... Date.....

**APPENDIX 2: HEALTH WORKER (NUTRITIONIST) QUESTIONNAIRE**

Name of the rehabilitation centre    1.Mathari Hospital        2.Nairobi Place

Designation/Job description e.g. Nurse or Nutritionist .....

**Section One: Demographic data**

Age ..... (years)

Sex: 1. Male  2. Female

Level of education:

1. Primary

2. Secondary

3. Tertiary

4. University

5. Others (specify)

**Section Two**

2. For how long have you worked in this rehabilitation centre?

(1) 0-1 year (2) 2-5 years (3) more than 5 years

3. Have you received any professional training?

(1) Yes (0) No

4. If yes, what training have you received?

5. Do you think this rehabilitation centre provide enough and adequate nutrition interventions for the rehabilitation services?

(1) Yes (0) No

Why?.....

6. Does the rehab provide the following nutrition intervention?

a) Nutrition education      1) yes       0) No

What areas of emphasis .....

b) Supplementations      1) Yes       0) No

Others Specify .....

c) Dietary management    1) Yes       0) No

How it is done?

7. The table (1) below shows the resources required in rehabilitation centre tick appropriately if each sources is adequately available, available but not enough or not available at all in the rehab centre.

<b>Resources</b>	<b>Adequately available</b>	<b>Available but not adequate</b>	<b>Not available at all</b>
<b>FOOD</b> <b>Carbohydrates</b> Whole meal Ugali Potatoes White Rice Brown Rice Others.....			
<b>Proteins</b> Meat Eggs Fish Legumes Milk Nuts			
<b>Vegetables</b> Group A- Leafy vegetables			

Group B- Carrots, Pumpkins, Green peas and beans			
<b>Fruits</b> Mangoes Oranges/Lemons List commonly used			
<b>Supplements</b> Vitamin A Vitamin D Iron Folate B-Complex Multivitamin			
Nutrition Counselling by trained staff			
Others (specify)			

**APPENDIX 3: SUBJECTS QUESTIONNAIRE****Serial No-----**

Name of rehabilitation center 1.Mathari Hospital 2.Nairobi Place

**PART I: USED DURING THE 1<sup>ST</sup> ENCOUNTER ONLY.**

1. Age -----years

2. Religion 1) Protestant  2) Catholic 3) Muslim  4) Hindu 3. Marital status 1) Single  2) Married 3) Divorced  4) Widowed 4. Education level 1) None  2) primary 3) Secondary  4) Tertiary 

5. Employment status

1) Employed  2) Unemployed 

6. If employed how much do you earn per month?

1) < 5000  2) 5000-10000 3) 10000-20000  4) >20000 

7. Which type of alcohol have you been using? 1) Homemade 2) Factory made 3)

Both

8. How long have you been drinking? 1) &lt; 5 yrs 2) 5-10 yrs 3) Over 10 yrs

9. How long have you been to rehabilitation centre? .....

10. Do you have any of the following medical problems (as per doctors)?

1) Stomach ulcers 2) Liver cirrhosis 3) Dirrhoea 4) Bleeding gums/nose 

5) Others (specify).....

**PART II: USED DURING THE 1<sup>ST</sup> AND 2<sup>ND</sup> ENCOUNTER.**

11. How is your condition now as compared to when you arrived in rehabilitation center?

- 1) Improving
- 2) No difference
- 3) Somehow better

**2) Anthropometric measurements**

Readings	1st	2nd	Average
Weight (kgs)			
Height (m)			

**INTAKE ON THIS SECTION SHOULD BE COLLECTED FROM THE STUDY SUBJECTS DURING THE 1<sup>ST</sup> AND 2<sup>ND</sup> ENCOUNTER.**

**FOOD FREQUENCY QUESTIONNAIRE TABLE**

	1	2	3	4	5	6	7	8		
	Never								HOW MUCH EACH TIME	
	Per	1	2-3	1	2	3-4	5-6		See portion size pictures	
TYPE OFFOOD	month	per	Per	per	per	per	per	Every	For ABCD	
		month	month	week	week	week	week	day	A B C D	
Boiled rice									$\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1 ○ ○ ○ ○	picture
Rice cooked in fat or oil									$\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1 ○ ○ ○ ○	picture
Whole maize ugali									$\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1 ○ ○ ○ ○	picture
Refined ugali e.g jogoo									$\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1 ○ ○ ○ ○	picture
Sorghum ugali									$\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1 ○ ○ ○ ○	Picture
Millet ugali									$\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1 ○ ○ ○ ○	Picture
Boiled/roasted maize									$\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1 ○ ○ ○ ○	Picture
Boiled githeri									$\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1 ○ ○ ○ ○	Picture
Fried githeri									$\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1 ○ ○ ○ ○	Picture
Slices of 20g bread									Based on number of slices	
Slices of 40g bread									Based on number of slices	
White chapatti									$\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1 ○ ○ ○ ○	Picture



Brown chapatti									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Boiled irish potatoes									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Fried irish potatoes									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Boiled green bananas									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Fried green bananas									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Beans stewed									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
	1	2	3	4	5	6	7	8					
	Never								How much each time				
	Per	1	2-3	1	2	3-4	5-6		See portion size pictures				
TYPE OF FOOD	month	per	per	per	per	per	per	Every	For ABCD				
		Mon	Mon	Week	Week	Week	Week	Day	$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	
Boiled beef									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Chicken stew soup									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Fish									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Omena stew									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Liver( <i>all cooking methods</i> )									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Fried vegetables									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Pumkin leaves									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Cabbage									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Kales(sukuma)									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Managu/suja									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture

Vegetables boiled without fat									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Bean leaves									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Amaranthus									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Pumkin									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Avocado									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Ripe bananas									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Mango									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Orange									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Pawpaw									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Pineapple									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Passion fruit									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Water melon									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Guavas									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Raw tomato									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture
Raw carrots									$\frac{1}{4}$ ○	$\frac{1}{2}$ ○	$\frac{3}{4}$ ○	1 ○	Picture

**APPENDIX 4: FOOD PORTION PICTURES**

**UGALI**



**1 cup-300g**



**3/4 cup-225g**



**1/2 cup-150g**



**1/4 cup-75g**

**FRIED KALES (SUKUMA WIKI)**



**1 CUP-200g**

**FRIED CABBAGE**



**1 CUP-200g**

**BOILED PEAS**



**1CUP 250 g**

**BOILED BEANS**



**1CUP 250 g**

**Appendix 5: Probability Statement to Six classes of Observed Intakes.**

		<b>Class 1</b>	<b>Class 2</b>	<b>Class 3</b>	<b>Class 4</b>	<b>Class 5</b>	<b>Class 6</b>
<b>Row A</b>	Individuals intake as % of EAR	< 54	54- 65.5	65.5- 77	77- 88.5	88.5- 100	> 100
<b>Row B</b>	Probability of Inadequacy	1.0	0.93	0.69	0.31	0.07	0.0

## APPENDIX 6: ETHICAL APPROVAL



MOI TEACHING AND REFERRAL HOSPITAL  
P.O. BOX 3  
ELDORET  
Tel: 334711/2/3



MOI UNIVERSITY  
COLLEGE OF HEALTH SCIENCES  
P.O. BOX 4606  
ELDORET  
Tel: 334711/2/3

### INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)

Reference: IREC/2012/30  
**Approval Number: 000840**

4<sup>th</sup> July, 2012

Emmy C. Lang'at,  
Moi University,  
School of Public Health,  
P.O. Box 4606-30100,  
**ELDORET-KENYA.**

Dear Ms. Lang'at,

#### **FORMAL APPROVAL**

The Institutional Research and Ethics Committee has reviewed your research proposal titled:-

***"The Effect of Rehabilitation on Nutritional Status of Alcohol Dependent Males in Nairobi"***.

Your proposal has been granted a Formal Approval Number: **FAN: IREC 000840** on 4<sup>th</sup> July, 2012. You are therefore permitted to start your study.

Note that this approval is for 1 year; it will thus expire on 3<sup>rd</sup> July, 2013. If it is necessary to continue with this research beyond the expiry date, a request for continuation should be made in writing to IREC Secretariat two months prior to the expiry date.

You are required to submit progress report(s) regularly as dictated by your proposal. Furthermore, you must notify the Committee of any proposal change (s) or amendment (s), serious or unexpected outcomes related to the conduct of the study, or study termination for any reason. The Committee expects to receive a final report at the end of the study.

Yours Sincerely,

**PROF. E. WERE  
CHAIRMAN  
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE**



cc: Director - MTRH  
Principal - CHS  
Dean - SOM  
Dean - SPH  
Dean - SOD  
Dean - SON