The Effect of Rehabilitation on Nutritional Status of Alcohol Dependent Males in Nairobi, Kenya

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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. The main objective of the study was to determine the effect of rehabilitation on nutritional status of alcohol dependent males in Nairobi Place and Mathari hospital in Nairobi, Kenya.

Methodology: This was an experimental (Pre-post) study design of 57 rehabilitated alcohol dependent males recruited for the study within one week of admission and re-assessed after four weeks. Semi-structured interviewer administered questionnaire was used to collect data on social-demographic characteristics. A food frequency questionnaire was used to collect information on food consumed. Chi-square test of association, T-test and multivariate logistic regression were employed in the analysis. All the analysis was done using SPSS V.16.0 for windows and results were considered significant at 5% α- level.

Results: The proportion of under-nutrition before and after rehabilitation at Nairobi place was 10% and 5% respectively (χ^2=0.604, p=0.865). Mathari had 16.2% and 8.1% underweight before and after rehabilitation respectively (χ^2=1.349, p=0.592). In the first encounter 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 with adequate nutrients while Mathari hospital food was 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: 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. The Government and program managers need to consider and place emphasis nutrition in alcohol and drug rehabilitation programs.

Keywords: Alcohol dependence, Rehabilitation, Nutrition

INTRODUCTION

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.

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.

Study Objectives
1. Determine the changes in propotion 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.

Materials and Methods
This was an experimental (pre-post) study carried out in Nairobi between July to November 2012. 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.

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.

Exclusion criteria.
- Alcohol dependent males with active psychotic symptoms.

Data Collection Tool and procedures
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.

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.

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.

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).

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 $weight(kg)/height^2(m)$, classified the subjects as undernourished when BMI was less than 18.5 kg/m^2, normal at 18.5–24.9 kg/m^2, overweight at 25–29.9 kg/m^2 and obese if more than 30 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 (Rosalid, 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 was calculated as 50g /EAR for CHO (100) *100, 50% was <54 and the probability inadequacy was 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% α level. Qualitative data obtained from interview was coded and frequencies generated.

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.

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 were 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.

RESULTS
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 (±8.3) and age range of 20-53 years. Nairobi place had the mean age of 34.6(±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 1: Demographic characteristics of the respondents

Characteristic	Mathari Frequency (%)	Nairobi place Frequency (%)	Total Frequency (%)
Religion			
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)
Marital status			
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)
Education level			
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)
Employment status			
Employed	20 (54.1)	8 (42.1)	28 (50)
Unemployed	17 (45.9)	11 (57.9)	28 (50)
Income per month (Kshs)(employed)			
>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 2: Other characteristics of the respondents

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

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 ($\chi2$= 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 ($\chi2$ =0.604, p=0.865).

Table 3: Proportion of Under-nutrition based on BMI at Mathari and Nairobi Place

Mathari	BMI	Before	after	χ2	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)		

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: Adequacy of Nutrients intake in Mathari

Mathari Hospital							
		First encounter			**Second encounter**		
Nutrient	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(µg)	625	817.4 (857.6)	40.9	0.181	278.2	100	<0.001
Folate(µg)	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.

Difference in the means between the first and second encounter

Mathari			
	Before	**After**	
Nutrient	Mean (sd)	Mean	P-value
Carbohydrates(g)	387.0 (439)	841.9	<0.001
Protein(g)	50.2 (32.4)	146.6	0.001
Vitamin A(µg)	817.4 (857.6)	278.2	<0.001
Folate(µg)	90.4 (110.3)	137.4	0.001
Zinc(mg)	5.6 (2.7)	20.3	0.001
Vitamin B1(mg)	1.1 (0.7)	4.4	<0.001
Vitamin C(mg)	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 6: Adequacy of Nutrients intake in Nairobi Place

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

4.7: Difference in means between the first and second encounter

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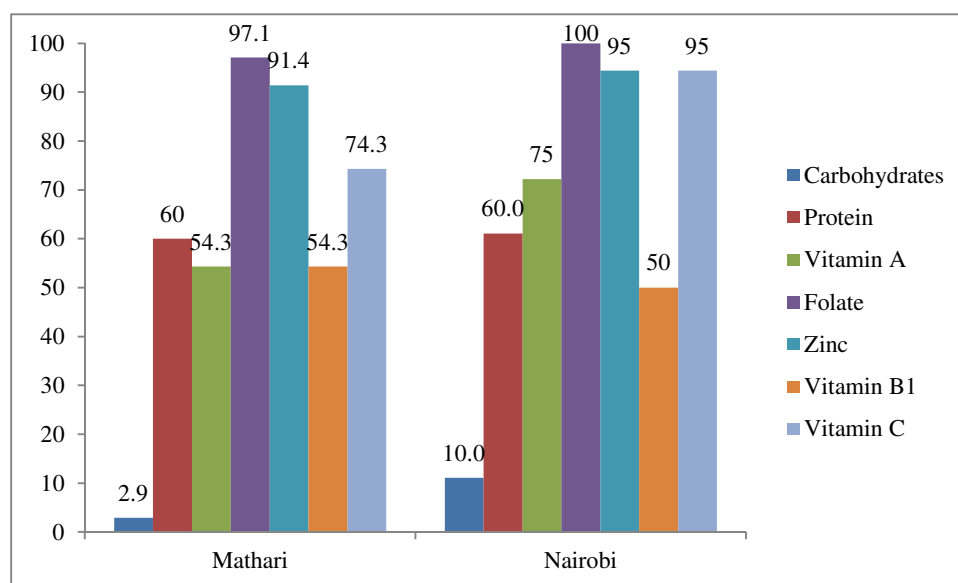

Fig 1: Percentage inadequate nutrient intake by site

Table 8: Differences in proportion of inadequate nutrient intake by study site (1st encounter)

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

* Fisher's exact chi-square

Under-nutrition and Risk Factors
As indicated in table 4.7, there was no significant relationship between age, religion, marital status, education level and employment and under-nutrition (p>0.05)

Table 7: Socio-demographics and under-nutrition

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

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

*Fishers exact chi square

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.

DISCUSSION
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).

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 in 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 .

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.

CONCLUSION AND RECOMMENDATIONS
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.

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

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APPENDICES

APPENDIX 1: 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   ◯

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.

Resources	Adequately available	Available but not adequate	Not available at all
FOOD **Carbohydrates** Whole meal Ugali Potatoes White Rice Brown Rice Others…….			
Proteins Meat Eggs Fish Legumes Milk Nuts			
Vegetables Group A- Leafy vegetables Group B- Carrots, Pumpkins, Green peas and beans			
Fruits Mangoes Oranges/Lemons List commonly used			
Supplements Vitamin A Vitamin D Iron Folate B-Complex Multivitamin			
Nutrition Counselling by trained staff			
Others (specify)			

APPENDIX 2: SUBJECTS QUESTIONNAIRE   **Serial No------**

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

PART I: USED DURING THE 1ST 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) < 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: <u>USED DURING THE 1ST AND 2ND ENCOUNTER.</u>

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

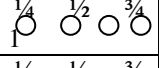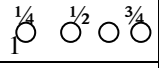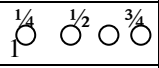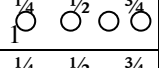1) Improving ☐   2) No difference ☐ Somehow better
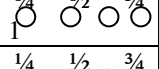
2) Anthropometric measurements

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

INTAKE ON THIS SECTION SHOULD BE COLLECTED FROM THE STUDY SUBJECTS DURING THE 1ST AND 2ND 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									¼ ½ ¾ 1	picture
Rice cooked in fat or oil									¼ ½ ¾ 1	picture
Whole maize ugali									¼ ½ ¾ 1	picture
Refined ugali e.g jogoo									¼ ½ ¾ 1	picture
Sorghum ugali									¼ ½ ¾ 1	Picture
Millet ugali									¼ ½ ¾ 1	Picture
Boiled/roasted maize									¼ ½ ¾ 1	Picture
Boiled githeri									¼ ½ ¾ 1	Picture
Fried githeri									¼ ½ ¾ 1	Picture
Slices of 20g bread									Based on number of slices	
Slices of 40g bread									Based on number of slices	
White chapatti									¼ ½ ¾ 1	Picture
Brown chapatti									¼ ½ ¾ 1	Picture
Boiled irish potatoes									¼ ½ ¾ 1	Picture
Fried irish potatoes									¼ ½ ¾ 1	Picture
Boiled green									¼ ½ ¾	Picture

bananas									1	
Fried green bananas									¼ ○ ½ ○ ¾ ○ 1	Picture
Beans stewed									¼ ○ ½ ○ ¾ ○ 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	¼ ○ ½ ○ ¾ ○ 1	
Boiled beef									¼ ○ ½ ○ ¾ ○ 1	Picture
Chicken stew soup									¼ ○ ½ ○ ¾ ○ 1	Picture
Fish									¼ ○ ½ ○ ¾ ○ 1	Picture
Omena stew									¼ ○ ½ ○ ¾ ○ 1	Picture
Liver(*all cooking methods*)									¼ ○ ½ ○ ¾ ○ 1	Picture
Fried vegetables									¼ ○ ½ ○ ¾ ○ 1	Picture
Pumkin leaves									¼ ○ ½ ○ ¾ ○ 1	Picture
Cabbage									¼ ○ ½ ○ ¾ ○ 1	Picture
Kales(sukuma)									¼ ○ ½ ○ ¾ ○ 1	Picture
Managu/suja									¼ ○ ½ ○ ¾ ○ 1	Picture
Vegetables boiled without fat									¼ ○ ½ ○ ¾ ○ 1	Picture
Bean leaves									¼ ○ ½ ○ ¾ ○ 1	Picture
Amaranthus									¼ ○ ½ ○ ¾ ○ 1	Picture
Pumkin									¼ ○ ½ ○ ¾ ○ 1	Picture
Avocado									¼ ○ ½ ○ ¾ ○ 1	Picture
Ripe bananas									¼ ○ ½ ○ ¾ ○ 1	Picture
Mango									¼ ○ ½ ○ ¾ ○ 1	Picture
Orange									¼ ○ ½ ○ ¾ ○ 1	Picture
Pawpaw									¼ ○ ½ ○ ¾ ○ 1	Picture
Pineapple									¼ ○ ½ ○ ¾ ○ 1	Picture
Passion fruit									¼ ○ ½ ○ ¾ ○ 1	Picture

Water melon								¼ ½ ¾ 1		Picture
Guavas								¼ ½ ¾ 1		Picture
Raw tomato								¼ ½ ¾ 1		Picture
Raw carrots								¼ ½ ¾ 1		Picture

APPENDIX 3: FOOD PORTION PICTURES
UGALI

1 cup-300g

3/4 cup-225g

½ cup-150g

¼ cup-75g

FRIED KALES (SUKUMA WIKI)   **FRIED CABBAGE**

1 CUP-200g

1 CUP-200g
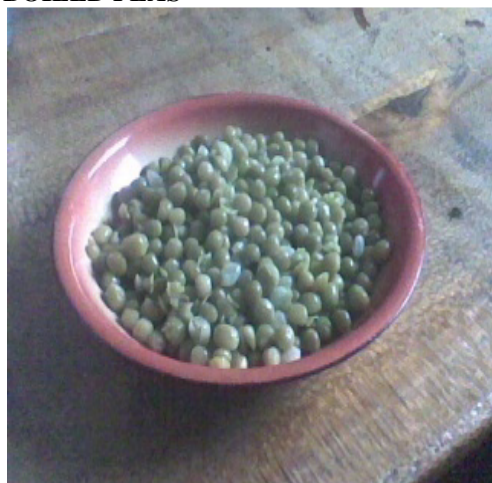
BOILED PEAS   **BOILED BEANS**

1CUP 250 g

1CUP 250 g

Appendix 4: Probability Statement to Six classes of Observed Intakes.

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

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