

**ASSOCIATION BETWEEN UNDERNUTRITION (AS EVIDENCED BY LOW BMI)
AND MENTAL ILLNESS IN LUSAKA AT CHAINAMA HILLS HOSPITAL**

BY

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**Dissertation submitted to the University of Zambia for the fulfilment requirement of a
Master of Science in Epidemiology and Biostatistics**

(2017)

DECLARATION

This dissertation is the original work of Dr. Mazuba Makamo.

It has been produced in accordance with the requirements and guidelines for attaining a Master of Science in Epidemiology and Biostatistics at The University of Zambia.

It has not been submitted for another degree at this University or elsewhere.

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CERTIFICATE OF APPROVAL

The University of Zambia approves this dissertation of Dr. Mazuba Makamo, in partial fulfilment of the requirement for the award of the degree in Master of Science in Epidemiology and Biostatistics.

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CERTIFICATE OF COMPLETION OF DISSERTATION

I, DR. MAZUBA MAKAMO,

Hereby certify that this dissertation is the product of my own work. In submitting it for the degree of Master of Science in Epidemiology and Biostatistics program, I further attest that it has not been submitted to this or another University in part or whole for the award of any program.

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I, Dr. Phoebe Bwembya,

Having supervised and read this dissertation is satisfied that this is the original work of the author under whose name it is being presented.

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ABSTRACT

Background

Undernutrition in mental illness remains a major problem. However, limited attention has been paid to addressing the problem. In Zambia, there is paucity of information on this subject. This study aimed at establishing the prevalence of undernutrition and determining the association between undernutrition and mental illness, using body mass index (BMI, kg/m²), at Chainama Hills Hospital in Lusaka. The study also investigated socio- demographic factors associated with undernutrition in mental illness.

Methods

A descriptive cross sectional study based on quantitative approaches involving 412 men and women was conducted at Chainama Hills Hospital. A short questionnaire was administered after obtaining a written informed consent. Patients were examined by the Principle Investigator. The weight (Kg) and height (m) and resulting BMI were measured using a standardized scale, stadiometer and BMI calculator respectively. The diagnosis of mental illness and current medication was obtained from the patient's medical file as indicated by the attending Psychiatrist. The classification of mental illness is based on the DSM V manual. Bivariate and multivariate analysis with Stata v 13.1 was carried out.

Results

The prevalence of undernutrition in the study was 29% across all mental illness types seen at the time. The prevalence was higher among patients with Alcohol use disorders (38%). The odds of undernutrition was significantly higher among Alcohol use disorders than any other type of mental illness odds ratio (OR) = 2.7 (P<0.001, 95% CI), adjusted odds ratio (aOR) = 2.5 (P<0.01, 95%CI). The odds of undernutrition was much lower among patients with Convulsive disorder OR= 0.24 (P= 0.04, 95%CI), aOR= 0.28 (P=0.04, 95%CI). After adjusting for socio-demographic factors, the odds were still higher in Alcohol use disorders aOR= 2.1 (P<0.01, 95%CI), and still lower among Convulsive disorders aOR= 0.31 (P=0.06, 95%CI). Factors associated with undernutrition included male gender, low level of education, low social economic status and hospitalization.

Conclusion

The prevalence of undernutrition in Mental illness was 29% in this study. Alcohol use disorders were strongly associated with undernutrition while Convulsive disorders were protective. Based on the results of this, treatment of Alcohol use disorders should always include appropriate nutritional supplementation. Anthropometric measurements should be routine for all patients at the hospital. This will reduce morbidity in mental illness due to undernutrition. It is strongly recommended that a policy to regulate the drinking habits and patterns in Zambia be put in place. This should help to reduce avoidable mental illness morbidity due to Alcohol abuse.

DEDICATION

This dissertation is dedicated to my lovely children. Kuthandile Natalie, Khumbu James and Kupela Maya. The little angels that have brought so much meaning in my life. I thank God for you and May the blessings of the Lord always come upon you countless times like the sun's rays. I draw my inspiration from you and I realize each day that anything good is possible because of you. My dear wife Alice for your endless support and love. Your understanding and for standing by me through it all. May the Lord bless you. My aunt Elizabeth Lowole Mukuka who has seen me through it all, has loved me and cared for me like no one would. I love you. My dad and mom who have since gone to be with the Lord, I only hope I have made you proud. My friend Gabriel Walubita, my source of strength and counsel. Thank you so much and much love. To all those I haven't mentioned but play a great role in my life I say thank you for your support encouragement and love.

ACKNOWLEDGEMENTS

I would like to thank God for the favor he has granted to me to pursue this study without difficulties. I would also like to thank my lecturers from the School of Public health that have given me the guidance and yet maintained the originality of the study idea. This goes especially to my supervisors, Dr. Phoebe A. Bwembya, Mr. Mumbi Chola and Ms. Jessy Zg'ambo that have been very helpful with great insight and meaningful contribution to the study. I would also like to thank the ERES converge for the guidance on pertinent ethical concerns with the study. Also, thanks go to the Ministry of Health through the Provincial Health Office and the District Medical Office for allowing me to conduct the study at Chainama Hills Hospital. Further I would like to thank the administration at Chainama Hills Hospital for the support they offered during the study period. I wish to thank the participants in the study for their time and cooperation during data collection. Finally, I would like to thank my family for the care, understanding and support during the study.

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ABBREVIATIONS AND ACRONYMS

ASPEN	American Society for Parenteral and Enteral Nutrition
BMI	Body Mass Index
CDC	Centre for Disease Control
CIOMS	Council for International Organizations of Medical Sciences
DSM	Diagnostic statistical manual for mental disorders
EDHS	Ethiopian Demographic Health survey
HIV	Human Immuno-deficiency Virus
MHaPP	Mental Health and Poverty Project
MoH	Ministry of Health
NBS	National Bureau of Standards
WHO	World Health Organization
UNICEF	United Nations International Children’s Emergency Fund
UTH	University Teaching Hospital
UNZA	University of Zambia
ZNHP	Zambian National Health Policy

CHAPTER 1

BACKGROUND

Undernutrition continues to be a major problem among mental illness patients. It is an area in mental health that demands further information. There has been a great deal of research on undernutrition in special populations such as women and children. However, another special group of people, the mentally ill, who are prone to undernutrition have not been investigated thoroughly for undernutrition. In Zambia, there is limited published data on this relationship.

Undernutrition is commonly noted among depressed and substance abuse related psychiatric patients. The major contribution is due to the chronically disabling nature of depression, alcohol/substance abuse disorders and psychoses. About 14% of the global burden of disease has been attributed to neuropsychiatric disorders, (WHO, 2012). Globally, about 450 million people are affected by neurological or behavioral mental disorders. Out of these, 873,000 commit suicide annually. This has led to increasing attention paid to the importance of mental disorders as a problem of public health concern. The World Health Organization (WHO) 2005 report, attributed 31.7% of all years lived-with-disability to neuropsychiatric conditions: the five major contributors to this total were unipolar depression (11.8%), alcohol-use disorder (3.3%), schizophrenia (2.8%), bipolar depression (2.4%), and dementia (1.6%).

Undernutrition may be defined when the body mass index (BMI) is less than 18.5kg/m² (WHO 2015). BMI is the weight for height relationship. Undernutrition may be caused by several factors ranging from metabolic disorders to chronic debilitating diseases like HIV infection, TB, cancer and sometimes it may be idiopathic.(Kumar 2012). However, the presence of undernutrition in mental health has not been explored in Zambia. It is likely that mental health disorders have been underestimated and therefore, there is a lack of appreciation with regard to the links between mental illness, undernutrition and other health conditions,” (WHO, 2011). Several studies in different regions of the world have been conducted to investigate the relationship between undernutrition and mental illness. The studies so far deal with the relationship between a specific type of mental illness and undernutrition. In most of the studies reviewed, it is clear that mental health patients are undernourished and the more severe the Mental illness the greater the degree of undernutrition (Bartoszek et.al 2015). Impaired mental health is strongly vulnerable to the risks of having involuntary weight gain, weight loss, or

deficiency of essential nutrients, (Wallace JI, 2009). This is because of poor self-care, being unable to shop or prepare foods, poor diet, and unhealthy lifestyle. In addition, loss of appetite, being unable to eat regularly, and energy expenditure contribute to undernutrition, (Lowe B *et.al* 2008).

CHAPTER 2

2.1 PROBLEM STATEMENT

Individuals with mental health problems and mental disorders are marginalized, stigmatized, and discriminated against. Against this background, the National Health Policy (NHP) has taken mental health as a crucial component of Primary Health Care and the overall health service delivery strategy, (NHP, 2012). Mental illness patients are at high risk of developing undernutrition in the developing countries, (Jenkins 2011). Studies in Europe and Asia have demonstrated undisputedly undernutrition in mental illness. Although these studies in other regions of the world try to explain the relationship between mental illness and malnutrition, there is very little evidence in Africa and limited data in Zambia to substantiate this problem. There is no information on the occurrence of undernutrition among mental illness patients. It is in view of this lack of information on the subject that treatment of mental illness patients with undernutrition is not regarded with the urgency that it deserves. The Literature so far has demonstrated the high prevalence of undernutrition among Japanese patients with Schizophrenia, (Takuro *et al*, 2015), but has not shown any prevalence in other mental illnesses. This is a gap that this study will fill. Furthermore, Kvamme *et.al* (2011) in Norway, did not consider senility and institutionalization as strong confounders of undernutrition in mental health. This study took in to consideration all age groups, inpatients and outpatients to deal with age or institutionalization as possible confounders. Bartoszek *et al* (2015) demonstrated that poor nutrition tends to worsen the degree of mental health symptoms. This has been demonstrated in the theoretical framework of this study (Figure 1).

There is limited evidence in Zambia to give an approximation of measure to the degree of the problem. At Chainama Hills Hospital, patients are treated using drugs, psychotherapy, social therapy and electroconvulsive therapy, but there is no inclusion of nutritional supplementation in the treatment protocol or guidelines. Like in any other illness, mental illness requires better understanding for better centered treatment of patients. Due to lack of understanding from literature, the treatment of mental illness with undernutrition is not given the attention it

deserves. There is need to determine the prevalence of undernutrition and understand the association between undernutrition and mental illness.

This research was conducted to add to the body of knowledge, provide information on the gaps regarding the prevalence of undernutrition in mental illness and the association between the two at Chainama Hills Hospital. The study provided an opportunity to have insight into the depth of the burden and made recommendations for making mental illness bearable. Furthermore, the study findings indicated the need for a much wider and representative study.

2.2 JUSTIFICATION

This study is novel in adding new knowledge on mental health and nutritional issues in Zambia. No comprehensive epidemiological studies have been undertaken to determine the extent of undernutrition in mental illnesses in the Zambian population. It is estimated that 20-30% of the general population has mental health problems (ZNHP, 2012). The study will help to theorize the knowledge known on mental illness and undernutrition, thereby creating a conceptual framework to better explain the problem. This will in turn help to manage undernutrition in mental illness at Chainama Hills Hospital. Further, the participants found to be undernourished in the study were linked to a nutritionist in the hospital. This helped to attend to their nutritional demands. The research established the prevalence of undernutrition in mental illness using BMI at Chainama Hills Hospital. The study has also shown Socio-demographic factors that are associated with undernutrition in mental illness patients at Chainama Hills Hospital. This new information will help to treat patients with mental illness with consideration to their nutritional deficiency.

2.3 OBJECTIVES

2.3.1 Main Objective

To establish the prevalence of undernutrition and determine its association with mental illness in adult mental patients at Lusaka's Chainama Hills Hospital.

2.3.2 Specific Objectives

1. To determine the occurrence of undernutrition among mental illness patients using BMI at Chainama Hills Hospital.
2. To correlate undernutrition with type of mental illness
3. To correlate undernutrition with socio-demographic profile of patients.

2.4 THEORETICAL FRAMEWORK

The theoretical framework below illustrates how undernutrition is related to mental illness with the socio-demographic factors taken into consideration. It demonstrates that with undernutrition there is an increase or worsening of mental health symptoms, Kvamme (2011). Further, as the Mental illness symptoms worsen the degree of undernutrition also worsens. It has been shown in studies such as Majumdar 2016, that socio-demographic factors such as low level of education, unemployment, low social economic status increasing age and being single are related to undernutrition. This relationship is not unique to mental illness patients but is true for the general population. Further, it is more apparent in developing nations, Jenkins (2011). Severe forms of mental illnesses are seen more commonly among patients with low social economic status, unemployed and low level of education. The degree of physiological stress is higher and thus the manifestation of mental illness is higher. Furthermore, with mental illness there is unemployment, low education level, inability to make lasting social ties such as marriage and whence the bi-directional relationship. Undernutrition is commoner in people of a low socio-economic status. Poor socio-demographic factors enhance undernutrition. Conversely, with undernutrition comes poor cognitive ability and consequently a low socio-economic status and an increase in the manifestation of mental health symptoms.

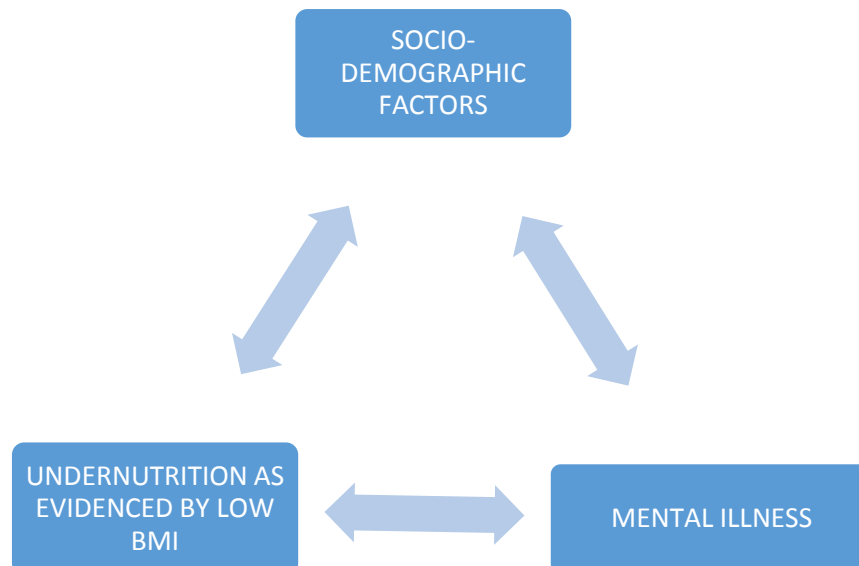


Figure 1: Theoretical framework of the association between undernutrition and mental illness

CHAPTER 3:

LITERATURE REVIEW

Undernutrition in mental illness cannot be underestimated. According to WHO 2015 report, Undernutrition accounts for 14% of the global burden of disease. Undernutrition is well studied in special populations such as Women and Children. Mental illness patients are another special population that has not received enough attention with regards to Undernutrition.

Globally, studies have been done to investigate undernutrition in Mental illness. A study by Kvamme (2011), to determine the risk of malnutrition on mental health symptoms, conducted in a community of elderly men and women in Tromsø, Norway, showed that the risk of malnutrition was found in 5.6% of the men and 8.6% of the women. Significant mental health symptoms were reported by 3.9% of the men and 9.1% of the women. Participants with a BMI of < 20 had a twofold increased risk to having significant mental health symptoms (SCL-10 score 1.85), compared to the reference category (BMI 25-27.4). This study showed that there is an increased risk of malnutrition with significant mental health symptoms. Furthermore, we can infer that this becomes a vicious cycle; as undernutrition worsens, there is an increasing significance of mental health symptoms. This study, however, did not consider senility, institutionalization and social economic status as confounders of undernutrition in mental health patients. A more comprehensive and comparative study would be one that excludes the above variables as confounders. These confounders will be dealt with in this study in data collection as well as in the analysis stage.

Another study investigated the prevalence of underweight and undernutrition among Japanese inpatients with Schizophrenia. This nationwide survey compared inpatients with outpatient's states of underweight. It revealed that there was a high prevalence of undernutrition among patients with Schizophrenia in Japan. It further showed that the prevalence of underweight and undernutrition in Japanese inpatients with Schizophrenia was higher (17.4%) than in outpatients and the general population (4.3%). It also revealed that the prevalence of underweight was 4 to 6 fold in inpatients older than 50 years. The proportion of individuals with hypocholesterolemia was also significantly higher in inpatients with Schizophrenia than in outpatients (Takuro *et al.*, 2015).

The challenge with this study is that it focused on undernutrition in Schizophrenia. However, undernutrition in other mental health illnesses was not addressed, this is a knowledge gap that needs to be explored.

Bartoszek *et.al* (2015) conducted a study to define the state of nutrition through self-assessment of symptoms of Depression in the group of seniors living in the country side of Lubin province in Poland. The study centered on the relationship between the nutritional status of the elderly living in their home environment and the incidence of Depression. This study revealed that the risk of Depression had a substantial impact on nutritional status. It was found that in over 48% of the respondents, there was an increase in the symptoms of Depression with undernutrition.

Further, it has been known that undernutrition significantly increases the risk of poor physical and mental health-related quality of life. Nasser and Fagerstrom (2015), studied the prevalence and association of undernutrition with the quality of life among Swedish people aged 60 years and above. The results of this study showed that the risk of undernutrition was significantly associated with poor health related quality of life. This was both in the physical and mental dimensions. However, no significant association was observed between nutritional status and life satisfaction. In this regard, we may infer that undernutrition is associated with worse or severe mental health symptom.

In the Developing nations such as Botswana, the prevalence of undernutrition in adults according to a cross section study done in Botswana by Letsamo in 2014, is about 19.5% among males and 10% among females. Another Developing nation, Ethiopia, reported in 2011, through the Ethiopian Demographic and Health Survey that the prevalence of moderate/severe malnutrition among Ethiopian men and women aged 15–59 years was 13.4%. However, the prevalence of undernutrition in Mental illness is not well established in developing nations. Results from a study conducted by Nube *et.al* (2003), indicate that, in general, prevalence rates of undernutrition are rather similar in adult men and women. However, regional differences exist. In communities in Sub-Saharan Africa, prevalence of low BMI is on average, a few percent higher in men than in women; in South/Southeast Asia the reverse is the case. In some communities, differences in undernutrition prevalence between men and women are exceptionally large, (Nube, 2003).

The relationship between Undernutrition and Mental illness is poorly studied. M'hango *et.al* (2015) conducted a study to determine the prevalence of over nutrition and undernutrition among neuropsychiatric inpatients and outpatients at Zomba Mental Hospital in Malawi. The study recruited 158 males and 81 females. The study revealed that there was a high proportion of overweight patients and a notable presence of underweight patients among participants. This study form Southern Africa is different from the findings in Europe and Asia which reflected under nutrition in mental illness (Kvamme *et.al* and Bartosdek *at.al*). Further, findings from Malawi were also contrary to those by Jenkins, (2011) whose report suggests that the risk of undernutrition is higher in developing nations than developed nations.

The Zambia National Health Policy (2012) records that mental health problems and mental disorders are a major disease burden within the community in Zambia. The Mental Health situation is driven by factors such as family systems, poverty, rising rates of urbanization, unemployment, alcohol and substance abuse (including tobacco), child abuse, HIV/AIDS, and violence against women. The common mental disorders found in Zambia are acute psychotic episodes, schizophrenia, mood disorders, alcohol and substance abuse related problems and organic brain syndromes, especially due to HIV & AIDS.

Mental patients are at high risk of developing malnutrition in developing nations (Jenkins, 2011). The Ministry of health in 2015 reported that in Zambia, hospital based figures indicate a prevalence of mental health between 1.8 and 3.61 per 10000 population for acute psychotic states and schizophrenia respectively. About 10% of the admissions for acute psychotic states are alcohol and drug misuse related, where more males are reported to abuse alcohol and drugs than females. Other common mental conditions include; affective disorders and organic brain damage. According to the Mental Health and Poverty Project (MHaPP) Country Report (2008), about 2667 patients per 100 000 population are admitted to Chainama and other psychiatric units around Zambia with Chainama Hills Mental Hospital being the only specialized hospital for mental illness in Zambia.

Undernutrition in Mental illness may be due to the difficulty for mentally ill patients to access good nutrition, lack of employment among mental patients, lack of care from family members, poor nutrition in substance/alcohol abusers and a lack of insight to take care of self in mental

patients. Another cause may be co-morbidity with infectious diseases like Tuberculosis, HIV, diarrheal diseases and malignancy. (Schenker, 2003).

Several theories have been suggested on the assessment of undernutrition. One such theory is by the Academy of Nutrition and Dietetics and the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.), which proposed guidelines in 2011 for recognizing undernutrition. This guideline focuses less on laboratory diagnosis of malnutrition than on other clinical indicators. For this reason, undernutrition assessment in this study will rely mostly on BMI and physical examination. Serological markers of malnutrition are non-specific but may give an idea of the presence of undernutrition. Serological investigations are not only invasive but are also expensive. In view of the aforesaid reasons, this study will assess undernutrition using BMI and physical examination only.

Promoting healthy lifestyles can be enhanced by measuring individual nutritional status. The body mass index (BMI) is recognized as an important tool for measuring body fat content based on calculating the weight divided by height in meter squared (Pinson Richard, 2011; & WHO, 2015). The nutritional status of an individual is then determined and explained based on cut off points, which classifies the status in three categories: as underweight (<18.5), normal (18.99 to 24.99) or overweight (≥ 25) (WHO, 2015).

Mental health classification is based on the DSM V classification. This is what is currently being used at the only tertiary psychiatric institution in Zambia, Chainama Hills Hospital. Therefore, this study will use the DSM V classification of mental illness. And will use BMI to assess nutritional status.

Both acute and chronic alcohol consumption can cause malnutrition by decreasing dietary caloric intake, impairing nutrient digestion and absorption, decreasing protein synthesis and secretion, increasing catabolism of gut proteins, and increasing breakdown and excretion of nutrients. The degree of malnutrition depends on the amount of alcohol consumed, the quality of food intake, genetics, and the presence and severity of comorbid illnesses. The risk of developing micro- and macronutrient deficiencies increases significantly when alcohol makes up more than 30 percent of total caloric intake (Lieber, 2000).

One-way alcohol consumption can affect nutrition status is by displacing healthier foods from the diet. Alcohol has a caloric value of seven calories/gram (more than either protein or carbohydrate at four calories/gram), but contains no vitamins, minerals, protein, fat or carbohydrate.

Excessive alcohol consumption can satisfy caloric requirements, but easily leads to malnutrition and anemia. Although alcohol in small doses is an appetite stimulant, larger amounts suppress hunger, which doubly deprives the body of nutrients. When alcohol is metabolized by the liver it uses niacin, thiamine (vitamin B1) and other B group vitamins, which means that these vitamins are not available for other essential purposes. Alcohol also interferes with the absorption and storage of the vitamins B12, folate and vitamin A. Alcohol may trigger the release of large doses of vitamin A into the bloodstream, causing a slight, temporary sharpness of vision followed by night blindness

Alcohol is a diuretic that increases the output of urine, it can cause the loss of such water-soluble minerals such as zinc, magnesium and potassium. Zinc status appears to be particularly affected by alcohol and zinc deficiency interferes with the ability to taste and smell, further limiting dietary intake (Wallace, 2009).

The association between undernutrition and Mental illness is not clear in Zambia. This study will give a general picture of the relationship between undernutrition and Mental illness in Zambia from Chainama Hills Hospital as there is no published data so far.

CHAPTER 4: METHODOLOGY

4.1 STUDY DESIGN

A descriptive Cross sectional study based on quantitative approaches was used for this study. The study was conducted in April to May 2016. The exposure state (undernutrition) and the disease state (mental illness) were measured concurrently. The state of nutrition was a once off assessment. All mental patients being attended to at the hospital were invited to participate in the study. The patients and their immediate care givers were explained to on what will be involved and their role in the study. Most of the patients and their care givers showed keen interest to participate in the study. They were invited individually to sign a consent form. Thereafter, they were interviewed by the Principle Investigator. Patients who were very sick, were seen with their care giver and the questionnaire administered with the help of the care giver. However, those that had no family member or immediate care giver to stand by them were excluded from the study. This comprised only a small proportion of the patients as most were able to complete the questionnaire without difficulties. Permission was also sought to review their file for past medical history and a few details that the patients or care giver would not easily answer because they could not remember. After the questionnaire was completed, the patient's weight and height were measured and then a physical examination was performed to look for features that are pathognomonic for undernutrition. The patient and the care giver were thanked for their participation in the study. Those that were found to be undernourished were linked to the nutritionist for further intervention and treatment through the nurse in charge of the wards at the time.

The findings were then entered in excel and then exported to Stata. String variables were coded. The data was analyzed using Stata version 13.1. basic statistical analyses were performed. Associations were measured using regression analyses. Firstly, associations were measured at univariate level. This was followed by analyses at multivariate level. Variables that were significant and had a P-value of 0.1 or less were included in the final multivariate model to check for interaction or confounding. Hard copies of the questionnaire were labelled and stored for later reference.

4.2 STUDY SITE

The study was conducted at Chainama Hills Hospital inpatient and outpatient departments. This site was chosen because it is a referral center for psychiatry cases in Lusaka. Most of the challenging psychiatric cases in Zambia are referred to this facility. Additionally, the site has a qualified psychiatrist and is a teaching institution. Diagnoses and treatment are more reliable at this hospital. It also is the biggest psychiatric institution in Zambia and therefore likely to give a good representation of mental illness in Zambia. At Chainama Hospital the patient staff ratio was estimated at about 1:30 for doctors and 1:20 for the nurses.

During the study period, Chainama Hills Hospital had a bed capacity of more than 200 beds. This did not include floor beds in the hospital. At the time of the study, Provincial and District hospitals did not have trained mental health staff. This situation prompted untrained staff to refer most cases of severe mental illness directly to Chainama Hills Hospital in Lusaka. The hospital had an inpatient and an outpatient department. The outpatient department attended to all new cases as well as reviewed the old known stable patients to the facility. The inpatients department also attended to patients whose illness required close supervision and hospitalization. In addition, the inpatient also took care of mental illness patients that had been abandoned or forgotten by their relatives. As Chainama Hospital was also responsible for training psychiatrists in the country (Birbeck, 2006), it was an appropriate site for the study.

4.3 STUDY POPULATION

The study participants included all eligible patients being attended to at Chainama Hills Hospital at the time of data collection. This included inpatients as well as outpatients. The inpatients were seen from their respective wards. They were individually invited to participate in the study. Four out of the five wards that were active at the time, were visited. The wards record an average of 40 patients each. The wards visited were two male wards, Chainama east ward and the female ward. There was another ward that attended to mental illness patients with other medical or surgical ailments. This ward was not visited because it had patients that had possible confounders. The outpatients were seen as they came through for their reviews. First attendants at the hospital were excluded from the study. A total of 412 male and female patients were enrolled in the study.

4.4 SAMPLE SIZE

The minimum sample size was calculated using proportions.

$$n = \frac{Z^2 \pi (1 - \pi)}{e^2}$$

Since there has been no study similar to this one that could be referred to the following assumptions were made:

- a. Confidence interval at 95%
- b. $\pi = 0.5$
- c. $e = 0.05$
- d. $Z = 1.9$

The minimum sample size from this was calculated at 385 participants.

On preliminary investigation at the site, the sample size anticipated was 350 patients. For this reason, a census was conducted. All mental patients eligible and being attended to at the hospital were enrolled. This resulted in the total sample size being 412 participants.

4.5 DATA COLLECTION TOOLS

The participants provided written informed consent prior to being interviewed by the Principle Investigator. The interview was guided by a questionnaire. The participants were later examined. Their height was measured using a standardized stadiometer. Their weight was measured using a standardized Scale. The resulting BMI was calculated using a standard BMI calculator. The participants' medical record was reviewed for the diagnosis of the mental illness and the medication the patients were on. The classification of mental illness at Chainama Hills Hospital uses the Diagnostic Statistical Manual for mental disorders, DSM V. The medical file was also reviewed for information that the participant may have forgotten such as the date of diagnosis and co-morbidities that may be confounders to the outcome measure.

4.6 DATA ANALYSIS

The study was conducted between April and May 2016. Participants were invited individually and each one provided a written informed consent. A questionnaire was administered by the interviewer. Other details required such as the type of mental illness, current medication and duration of illness, were obtained from the participants' medical files. Participants were

examined by the PI and their Body Mass Index (BMI) was measured. The outpatients were invited to participate as they came through for their reviews in the out-patient department. They were approached before taking their vitals at the nurses' bay. The vitals are routinely taken for outpatients before they are reviewed by the clinician. All the inpatients that were eligible were invited to participate in the study. These were interviewed examined and anthropometric measurements were taken from their respective wards.

This information was recorded on the questionnaire and then transferred in excel. The data was cleaned and then exported to Stata version 13.1 for analysis. String variables were coded. BMI was categorized as undernutrition ($\text{BMI} < 18.5 \text{Kg/m}^2$) and normal or above ($\text{BMI} \geq 18.5 \text{Kg/m}^2$). Bivariate analysis was used to check association between undernutrition and mental illness. This was adjusted by analyzing undernutrition with each mental illness type. The mental illness that had a P-value of 0.1 and less in the bivariate analysis was included in the final model for multiple regression analysis. Other variables in the socio-demographic profile were analyzed against undernutrition. Associations were determined and some of the variables of interest were included in the final model.

4.7 ETHICAL CONCERNS

Ethical clearance of the study was obtained from ERES converge. Ethical concerns that arise in studies to deal with mental illness patients include;

Informed consent: This is perhaps the most widely recognized ethical safeguard in clinical care and research. However, the discussion on how to safeguard the ethical principle in people with mental disorder poses some dilemma. By definition, people with mental disorders do not always tend to have diminished cognitive function and poor judgment, and are therefore not necessarily impaired for consent. (Koch *et.al* 1996). In most countries, the existing medical ethics policies require health practitioners to obtain informed consent from the patient prior to commencement of intervention. International codes of research ethics, such as the Declaration of Helsinki, outline key considerations of informed consent in a person who is legally incompetent, physically or mentally incapable of giving consent, or is a legally incompetent minor. Under these conditions, the investigator must obtain informed consent from the legally authorized representative in accordance with applicable law. Most recently, the International Ethical Guidelines adopted by the Council for International Organizations of Medical Sciences (CIOMS)

reassert the primacy of informed consent in Guideline number 15. Research involving individuals who, by reason of mental or behavioral disorders, are incapable of giving adequately informed consent requires the investigator to ensure that in cases where prospective subjects lack capacity to consent, permission is obtained from a responsible family member or a legally authorized representative in accordance with applicable law. The guidance obtained from Chainama hills hospital for patients that have been abandoned by their relatives to the institution is that the head of the hospital is responsible for the patients' welfare and may consent for the patient in the event that the patient cannot do so themselves. In this study, most of the patients could understand and consent for themselves to participate. However, there were a few who could not consent. All patients who were undernourished including those who were not eligible to participate in the study were referred to the local nutritionist for appropriate evaluation and treatment.

Beneficence: The participants in the study that were found to be undernourished were immediately referred to the local nutritionist through the nurse in charge of the ward or department where the patient was being attended. Some patients were counselled on a good diet and its benefits. Most of the patients were also counselled on good hygiene, a practice that was also emphasized by the nurses, especially on the wards.

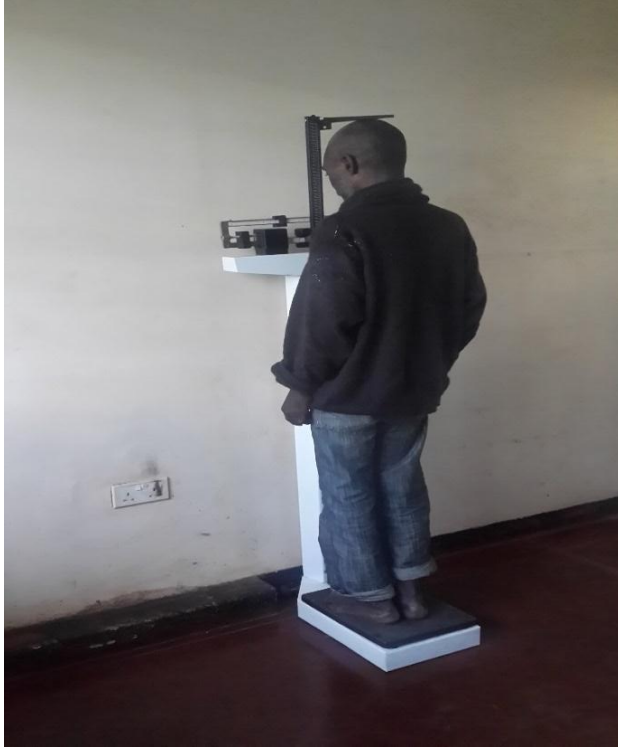


Figure 2: Measuring height and weight

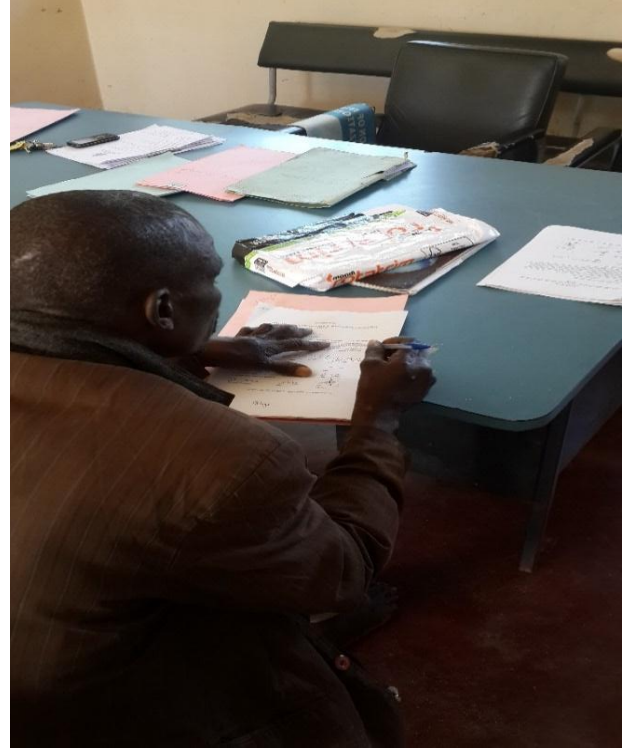


Figure 3: Obtaining Consent

CHAPTER 5: RESULTS

5.1 OVERVIEW OF BMI AMONG PARTICIPANTS

A total of 412 mental illness patients were seen between April and May 2016. All patients that were eligible and had accepted to participate in the study at the time of data collection were reviewed. About 60% were inpatient while 40% were outpatients. The table 1 below outlines the overview of the participants BMI.

TABLE 1: OVERVIEW OF PARTICIPANTS BMI

DESCRIPTION	ABSOLUTE (number of participants)	%
UNDERNUTRITION (<18.5Kg/m ²)	118	29
NORMAL WEIGHT (18.5-25 Kg/m ²)	215	52
OVERWEIGHT (25.1-28 Kg/m ²)	54	13
OBESE (>28 Kg/m ²)	25	6
TOTAL NUMBER OF PARTICIPANTS	412	100

Of the 412 mental illness patients reviewed, 29% were undernourished. They had a BMI of < 18.5Kg/m². Mental illness patients that had a BMI within normal range were 52%, while 13% were overweight and 6% were obese.

TABLE 2: TABLE OF UNDERNUTRITION ACROSS THE MENTAL ILLNESSES

MENTAL ILLNESS	TOTAL n (%)	UNDERNUTRITION (%)	PROPORTION (SE)	95% CI
Alcohol use disorders	82 (20)	38 (32)	0.46 (0.05)	0.36-0.57
Schizophrenia	143 (35)	41 (34)	0.29 (0.04)	0.21-0.37
Schizo-affective	21 (5)	2 (2)	0.10 (0.66)	0.02-0.32
Mood disorder	60 (15)	14 (12)	0.23 (0.06)	0.14-0.35
Brief psychotic disorder	18 (4)	7 (6)	0.39 (0.11)	0.19-0.63
HIV psychosis	7 (2)	2 (1.7)	0.3 (0.18)	0.06-0.70
Drug induced psychosis	35 (9)	9 (8)	0.26 (0.08)	0.14-0.43
Convulsive disorder	32 (8)	3 (2.5)	0.09 (0.07)	0.03-0.26
Depression	13 (3)	2 (2)	0.15(0.10)	0.04-0.47
Dementia	1 (0.2)	0 (0)	-	-

5.2 TYPE OF MENTAL ILLNESS

The prevalence of undernutrition in the various types of mental illnesses at the time of data collection are shown in Table 2 above. The mental illnesses seen and the percentage of

undernutrition are Schizophrenia (34%), Alcohol use disorders (AUD) (32%) and Mood disorders (15%). The others types of Mental illnesses seen include Schizo-affective, Brief Psychotic disorder, Drug induced psychosis, HIV psychosis, Convulsive disorder Depression and Dementia. Schizophrenia and Alcohol use disorders accounted in total, 66% of all undernourished patients. The proportion of undernutrition among Alcohol use disorders was 0.46 while that among Schizophrenics was 0.29.

Table 5 and 6 reflects logistic regression showed that the odds of being undernourished when being treated for AUD is 2.7 times ($P < 0.001$, 95% CI), aOR=2.5 ($P < 0.001$, 95% CI) while that for convulsive disorders is OR=0.24 ($P = 0.020$, 95% CI), aOR= 0.28 ($P = 0.040$, 95% CI).on multivariate analysis where all possible socio-demographic confounders were included, the odds in the two types of mental illness were not significantly changed. For AUD, aOR= 2.1 ($P = 0.007$, 95% CI), while convulsive disorders was aOR=0.31($P = 0.08$, 95% CI).

TABLE 3: TABLE OF UNDERNUTRITION AND SOCIO- DEMOGRAPHIC PROFILE

	TOTAL n (%)	UNDERNUTRITION n (%)	PROPORTION (SE)	95%CI
SEX				
Male	277 (74)	89 (75)	0.32 (0.28)	0.27 -0.38
Female	135 (26)	29 (25)	0.22 (0.35)	0.15- 0.29
Inpatient				
Outpatient	245 (60)	86 (73)	0.35 (0.03)	0.13-0.25
	167 (40)	32 (27)	0.19 (0.03)	0.29-0.41
SOCIAL ECONOMIC STATUS				
Low	291 (71)	91 (77)	0.31 (0.03)	0.26-0.37
Medium	106 (26)	25 (21)	0.24 (0.04)	0.16-0.33
High	15 (3)	2 (2)	0.13 (0.09)	0.03-0.42
LEVEL OF EDUCATION				
No education	33 (8)	14 (12)	0.42 (0.09)	0.26-0.60
Primary	131 (32)	39 (33)	0.30 (0.04)	0.23-0.45
Junior secondary	82 (20)	28 (24)	0.34 (0.05)	0.25-0.45
Secondary	116 (28)	28 (24)	0.24 (0.04)	0.17-0.32
Tertiary	50 (12)	9 (7)	0.18 (0.05)	0.10-0.31
EMPLOYMENT				
Employed	54 (13)	17 (14)	0.31 (0.06)	0.20-0.45

Self-employed	43 (11)	11 (10)	0.26 (0.07)	0.14-0.41
Unemployed	314 (76)	90 (76)	0.29 (0.03)	0.24-0.33
SUPPLEMENTS				
Yes	27 (7)	14 (12)	0.52 (0.09)	0.33-0.70
No	385 (93)	104 (88)	0.27 (0.09)	0.22-0.32
HIV STATUS				
Positive	48 (11)	13 (11)	0.27 (0.06)	0.23-0.40
Negative	238 (58)	66 (56)	0.28 (0.03)	0.22-0.34
Don't know	126 (31)	39 (33)	0.31 (0.04)	0.23-0.40
HYGIENE				
Poorly kempt	93 (23)	54 (46)	0.6 (0.05)	0.48-0.68
Fairly kempt	210 (51)	55 (47)	0.3 (0.03)	0.21-0.33
Well kempt	109 (27)	9 (7)	0.08 (0.03)	0.04-0.15
ALCOHOL				
Yes	185 (45)	67 (57)	0.36 (0.04)	0.17-0.28
No	227 (55)	51 (43)	0.22 (0.03)	0.17-0.28
SMOKING				
Yes	99 (24)	31 (26)	0.31 (0.05)	0.23-0.41
No	313 (76)	87 (74)	0.28 (0.03)	0.23-0.33
DRUG ABUSE				
Yes	72 (17)	20 (17)	0.28 (0.05)	0.19-0.39
No	340 (83)	98 (83)	0.29 (0.02)	0.24-0.34

5.3 GENDER

About 74% of the participants were male and only 26% were female. There were fewer females being attended to than males (Table 3). There was also only one ward allocated to female mental illness patients at the institution. The hospital recorded fewer female attendants than males (figure 4). Of those that were undernourished, the proportion that was male was 0.32, while 0.22 were female. The majority, (75%), of the undernourished patient were male. On Univariate analysis, males were twice OR= 2 (P=0.026, 95% CI) as likely to be undernourished as females. On multivariate analysis, males were 23% more likely to be undernourished than females (Tables 5 and 6).

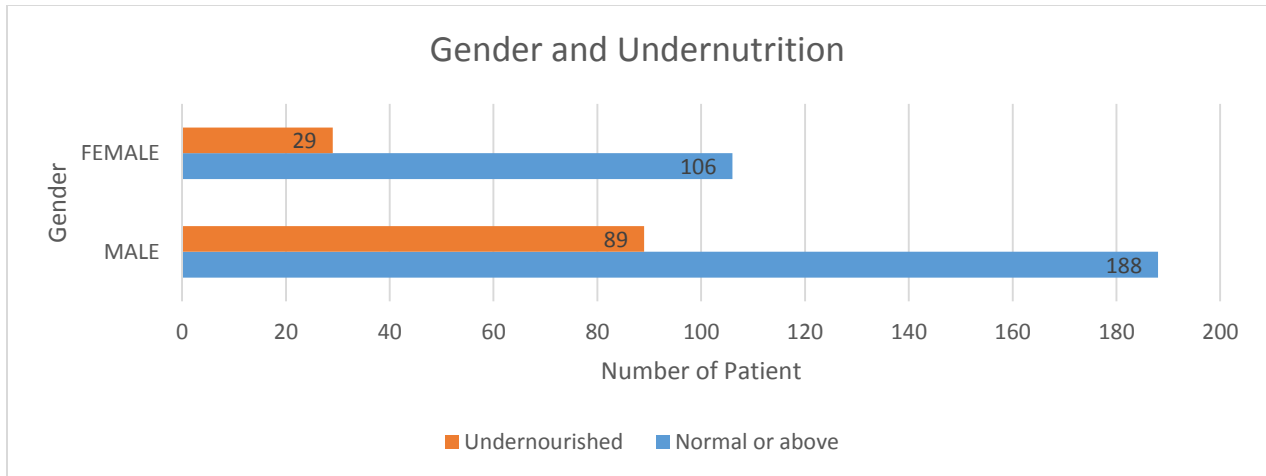


Fig 4: Gender and Undernutrition in Mental illness patients.

5.5 ADMISSIONS

Inpatients accounted for 60% of the study population with a proportion of 0.35 being undernourished (Table 3). Inpatients were OR= 2.3(P<0.001, 95% CI), times more likely to be undernourished than outpatients across the spectrum of all mental illnesses seen at the time of data collection. On multivariate analysis, inpatients were OR= 1.8 (P=0.016, 95% CI), times more likely to be undernourished than outpatients (Tables 6 and 7).

5.6 MARITAL STATUS

About 58% of the participants were single. These made up 65% of the undernourished participants. There were more undernourished single patients in comparison to the married (Fig 5). This is outlined in Table 3. The odds of being undernourished were, OR= 1.5 (P=0.060, 95% CI), times for single patients as for divorced/separated patients. Further the odds of being undernourished among the married mental illness patients was 0.72 (P=0.183, 95%CI) as for divorced/separated.

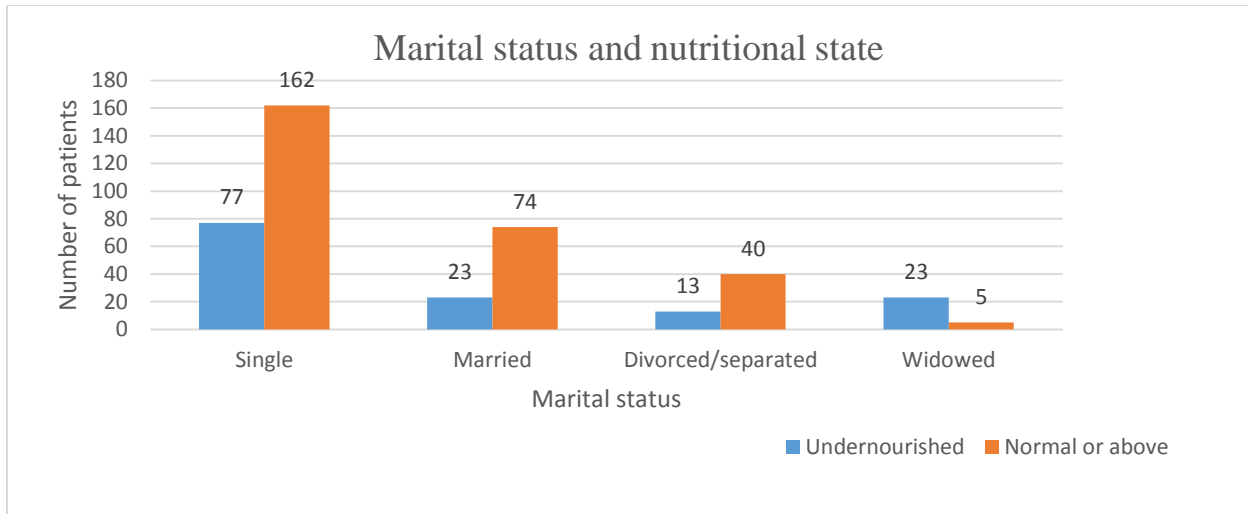


Fig 5: Marital status and undernutrition in mental illness

5.7 SUPPLEMENTS

Nutritional supplements were given to only 14% of the undernourished participants in the study as indicated in Table 3. This included patients with Alcohol use disorders, receiving vitamin B as part of the Detoxification regime. However, no other nutritional supplement such as high energy protein diet or other vitamins besides the B-group of vitamins were given. Further, a patient that was prescribed or recommended for nutritional supplements was 3 times ($P=0.008$, 95% CI) as likely to be undernourished as one who was not (Table 6 on logistic regression).

5.8 SOCIO- ECONOMIC STATUS

Participants with a low socio- economic status accounted for 71% of all the study participants (Table 3). This group further accounted for 77% of the undernourished patients in the study (Fig 3). On univariate analysis, the odds of being undernourished were 1.5 ($P=0.068$, 95% CI), aOR= 1.3 ($P=0.713$, 95% CI), for low socio- economic status as for high socio- economic status.

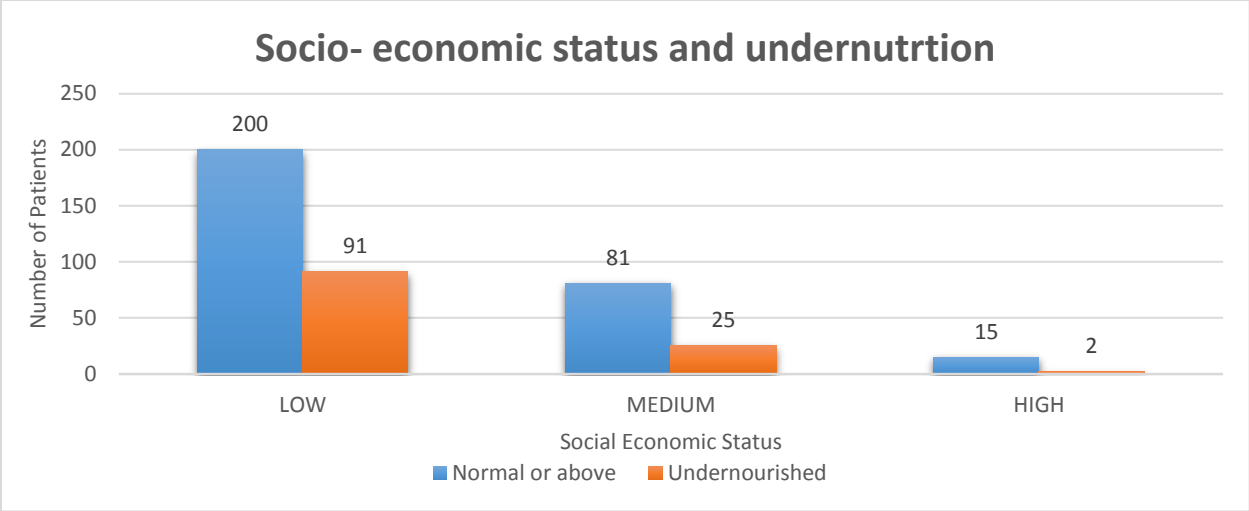


Fig 3: Socio- economic status and undernutrition in mental illness

5.9 EDUCATION

Over, 75% of the undernourished participants had attained only up to junior secondary school. The rest had done up to senior secondary or tertiary education. The higher the education level the less the odds of being undernourished. The odds of being undernourished if attained primary, secondary and tertiary were 0.7, 0.4, 0.3 respectively, as for those who did not receive any education. This shows that education among the mental illness patients at Chainama Hills Hospital is protective for undernutrition.

5.10 EMPLOYMENT

The problem with low employment levels is not unique to developing nations. However it is the level of unemployment that is worrisome. Among mental illness patients in this study, the unemployment level is 76%. Only 24% were in some form of employment, out of which 11% were self-employed. It was observed that the unemployed participants made up 76% of the undernourished participants. The odds of undernutrition among the unemployed and self-employed mental illness patients were 0.87 (P=0.674, 95% CI), and 0.74 (P=0.525, 95% CI) respectively as for employed mental illness patients. These results were however not included in the final multivariate model because the confidence interval was too wide.

5.11 HIV STATUS

In this study, 69% of the study population knew their HIV status. 58% were HIV negative and 11% were HIV positive. 31% did not know their HIV status. This is shown in Table 3. All those who knew their status were on Anti-retroviral treatment. The proportion of undernutrition among participants that did not know their status was higher. Therefore, knowing the HIV status in Mental illness patients may help to reduce undernutrition among mental illness patients. Table 6, reveals that the odds of being undernourished if HIV positive is 0.86 (P=0.62, 95% CI) times as for those who did not know their status. The odds of being undernourished when HIV negative was 0.83 (P=0.52, 95% CI) times as those who did not know their status. Even though we cannot rule out chance finding in this case knowing the HIV status in mental illness patients is protective against undernutrition.

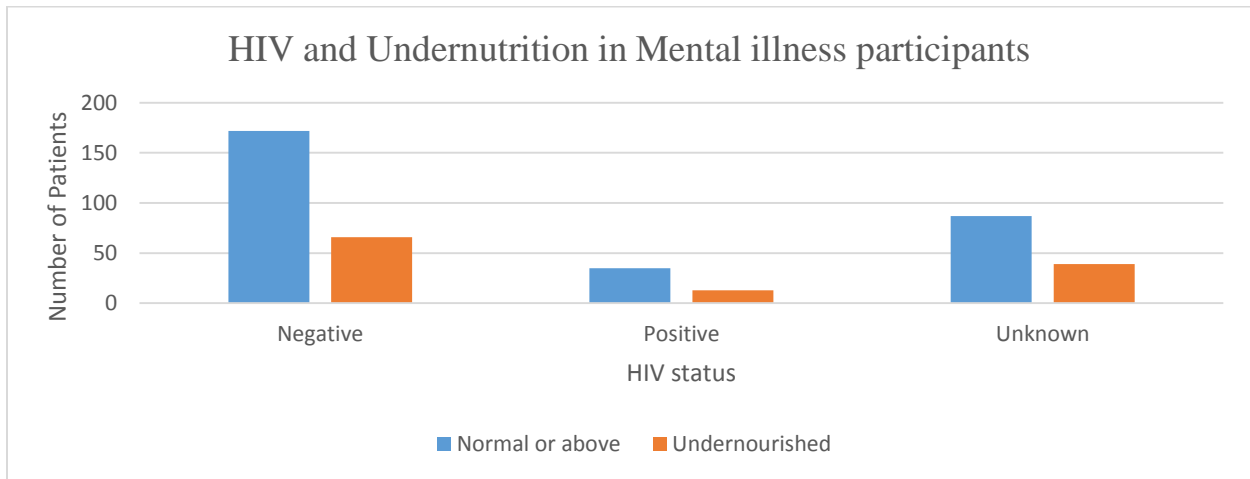


Fig 7: HIV and Undernutrition in mental illness

5.12 HYGIENE

The study showed that, hygiene is associated with undernutrition in mental illness participants. From Table 3, only 7% of the Undernourished participants were well kempt. Table 6 reveal that patients that were poorly kempt were four times (P<0.001, 95% CI) as likely to be undernourished as those that were fairly kempt. On the other hand, patients who were well kempt were 0.25 times (P<0.001, 95% CI) as likely to be undernourished as those that were fairly kempt.

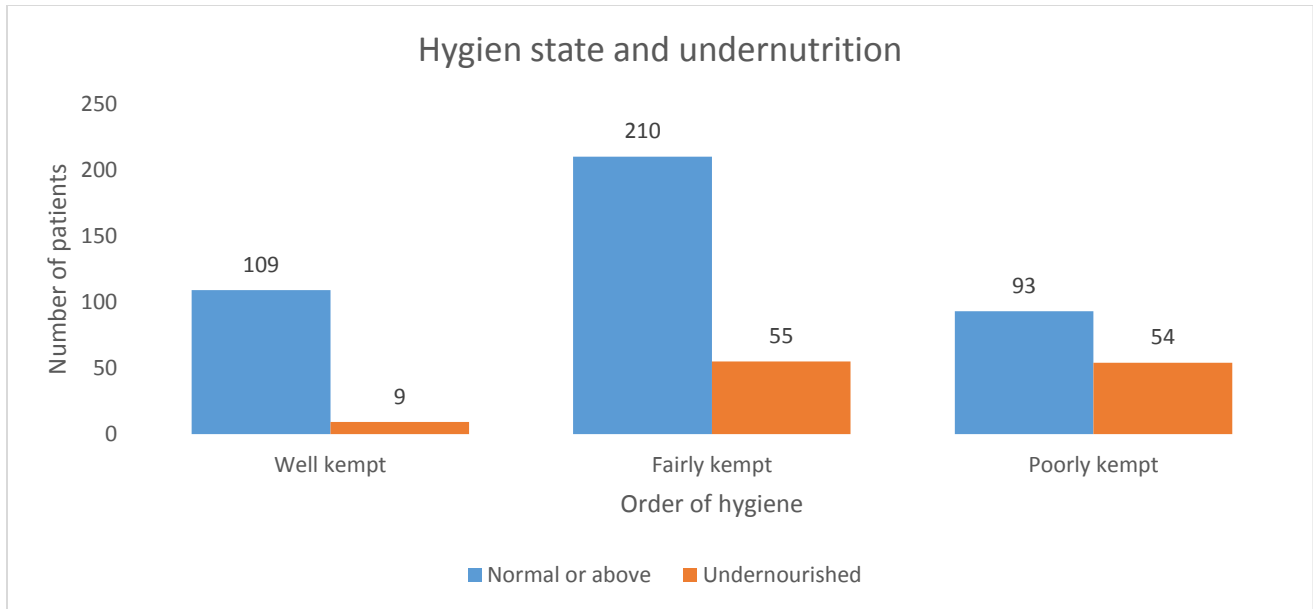


Fig 8: Hygiene state and undernutrition in mental illness

5.13 ALCOHOL, SMOKING AND DRUGS OF ABUSE

Table 3 also shows that 57% of the undernourished participants reported to have had taken alcohol within the last 3 months. Table 6 shows that participants who had reported abuse of alcohol in the past were 2 times more likely to be undernourished than those who had not . The commonest drugs of abuse reported by the participants were marijuana, Tobacco, heroin and cocaine. Most patients who had reported abuse of any one or more of these drugs had also abused alcohol. Most (76%) of the undernourished participants did not report smoking.

5.14 AGE

The mean age in the study population was 34.4 years. The youngest was 16 years and the oldest was 82 years old. There was no relationship between age and undernutrition in the study participants. We would anticipate a significant decrease in BMI with increasing age in accordance with the study by Kvamme in Norway 2012. However, the youngest patient is just as likely to be undernourished as the oldest in this study. OR= 1.00 (P=0.729, 95% CI). Even though the chance may not be excluded.

TABLE 4: TABLE OF PARTICIPANTS' RESIDENCE AND UNDERNUTRITION

RESIDENCE (Province)	TOTAL n (%)	UNDERNUTRITION (%)	PROPORTION (SE)	95% CI
Lusaka	320 (78)	94 (80)	0.29 (0.03)	0.25-0.35
Eastern	22 (5)	5 (4)	0.23 (0.09)	0.01-0.32
Western	6 (2)	1 (1)	0.17 (0.17)	0.02-0.68
North-western	5 (1)	0	-	-
Southern	7 (2)	2 (1.7)	0.29 (0.18)	0.06-0.70
Luapula	3 (1)	2 (2)	0.67 (0.33)	0.09-0.97
Northern	11 (3)	4 (3)	0.36 (0.15)	0.14-0.68
Copperbelt	6 (2)	1 (1)	0.17 (0.17)	0.02-0.68
Central	20 (5)	7 (6)	0.35 (0.11)	0.17-0.58

5.3 RESIDENCE

Patients represented in the study came from nine out of the ten provinces of Zambia. The majority (78%) of the participants came from within Lusaka province as shown in Table 4. Most of whom came from the densely populated areas of Lusaka. These comprised of people of a low socio-economic status. Of those that came from out of Lusaka, most were reported to have had no relatives to take them back home. These had since become resident at the hospital. One of them was reported to have had relatives come at least once every four to five months but claimed not have had capacity to take care of him fully.

TABLE 5: REGRESSION ANALYSIS OF UNDERNUTRITION AND TYPE OF MENTAL ILLNESS

	Proportion	Unadjusted OR (CI)	P-value	Adjusted OR (CI)	P-value
Alcohol use disorders (AUDs)	46	2.70 (1.63-4.46)	<0.001	2.5 (1.49-4.11)	<0.01
Schizophrenia	29	0.98 (0.63-1.56)	0.956	-	-
Schizo-affective	10	0.25 (0.05-1.09)	0.065	0.28 (0.06-1.25)	0.095
Mood disorder	23	0.72 (0.38-1.38)	0.327	-	-
Brief psychotic disorder	39	1.62 (0.61-4.29)	0.330	-	-
HIV psychosis	3	0.99 (0.19-5.20)	0.997	-	-
Drug induced psychosis	26	0.85 (0.39-1.88)	0.689	-	-
Convulsive disorder	9	0.24 (0.07-0.78)	0.020	0.28 (0.08-0.94)	0.040
Depression	15	0.44 (0.97-2.03)	0.295	-	-

- Indicates no value because the variable was not included in the multiple regression model. The multiple regression model considered variables with a P-value of 0.10 and less.

**TABLE 6: REGRESSION ANALYSIS OF THE PREDICTORS OF UNDERNUTRITION
IN MENTAL ILLNESS (UNIVARIATE ANALYSIS)**

VARIABLE	Unadjusted OR (CI)	P> z	95% CI
GENDER (Male)	1.7 (0.4)	0.026	1.07-2.80
Chronic disease	1.3(0.43)	0.379	0.71-2.49
Alcohol abuse	1.96(0.43)	0.002	1.27-3.02
SMOKING	1.1(0.3)	0.500	0.72-1.94
DRUG ABUSE	2.0(0.43)	<0.001	1.27-3.02
SUPPLEMENT	2.9 (1.17)	0.008	1.32-6.39
HYGIENE			
Poorly kempt	3.9 (1.0)	<0.001	2.33-6.52
Well kempt	0.25 (0.01)	<0.001	0.12-0.53
PELLAGRA	4.1(1.0)	<0.001	2.51-6.60
HIV STATUS			
Positive	0.86(0.21)	0.62	0.40-1.74
Negative	0.83(0.31)	0.52	0.53-1.37
INPATIENT	2.3(0.54)	<0.001	1.43-3.64
CURRENT MEDS			
Anticonvulsants	1		
Antidepressants	2.0(1.75)	0.035	1.10-12.84
Antipsychotics	3.8(2.36)	0.259	0.47-15.58
Antipsychotic + detox	2.7(2.43)	0.001	2.35-28.89
Detox	8.2(5.27)	0.241	0.57-8.95
Mood stabilizers	2.3(1.59)	0.013	1.75-128.4
SEVERITY			
Moderate	2.6(0.63)	<0.001	1.60-4.18
Severe	1.8(0.93)	0.269	0.64-4.96
LEVEL OF EDUCATION			
Primary	0.7(0.30)	0.410	0.31-1.61
Secondary	0.4(0.17)	0.042	0.19-0.97
Tertiary	0.3(0.15)	0.017	0.11-0.81
SOCIAL ECONOMIC STATUS			
Low	1.5(0.4)	0.068	0.65-13.4
Medium	0.7(0.2)	0.183	0.42-1.18
High	Ref	-	-
MARITAL STATUS			
Single	1.5(0.35)	0.060	0.74-2.89
Married	0.72(0.19)	0.221	0.42-1.21
Widowed	0.70(0.51)	0.479	0.40-1.53
Chronic disease	1.3(0.43)	0.379	0.71-2.49
OCCUPATION			
Unemployed	0.87(0.28)	0.674	0.47-1.63
Self employed	0.74(0.34)	0.525	0.31-1.83

TABLE 7: REGRESSION ANALYSIS OF UNDERNUTRITION WITH SIGNIFICANT MENTAL ILLNESS AND SOCIO-DEMOGRAPHIC FACTORS

Variable	Unadjusted OR (CI)	P-value	Adjusted OR (CI)	P-value
Alcohol use disorders (AUDs)	2.70 (1.63-4.46)	<0.001	2.10 (1.22-3.61)	0.007
Convulsive disorder	0.24 (0.07-0.78)	0.020	0.31 (0.08-1.06)	0.060
Gender (male)	1.73 (1.07-2.80)	0.026	1.23 (0.73-2.09)	0.443
LEVEL OF EDUCATION				
Primary	0.7 (0.31-1.61)	0.410	0.6 (0.31-1.78)	0.281
Secondary	0.4(0.19-0.97)	0.042	0.5 (0.28-1.45)	0.093
Tertiary	0.3(0.11-0.81)	0.017	0.4 (0.12- 1.09)	0.070
OCCUPATION				
Unemployed	0.87(0.47-1.63)	0.674	-	-
Self employed	0.74(0.31-1.83)	0.525	-	-
SOCIAL ECONOMIC STATUS				
Low	1.5 (0.65-13.4)	0.068	1.3 (0.28-6.58)	0.713
Medium	0.7(0.42-1.18)	0.183	1.3 (0.26-6.25)	0.765
High	ref	ref		
MARITAL STATUS				
Single	1.5 (0.74-2.89)	0.060	-	-
Married	0.72 (0.42-1.21)	0.221	-	-
Widowed	0.70 (0.40-1.53)	0.479	-	-
Inpatient	2.3 (1.43-3.64)	<0.001	1.8 (1.12-3.03)	0.016

- Indicates no value because the variables was not included in the multiple regression model

CHAPTER 6: DISCUSSION

The prevalence of undernutrition at Chainama Hills Hospital among inpatients and outpatients with mental illness was 29%. Alcohol use disorders (AUDs) and convulsive disorders were strongly associated with undernutrition. While AUDs increased the likelihood of undernutrition to as high as 3 times, convulsive disorders were protective by about 70%. There were social demographic and other factors associated with undernutrition in mental illness. These included, low level of education, low socio-economic status, marital status, male gender, poor hygiene and hospitalization.

While Zambia does not have data to compare the observed statistics on the prevalence of undernutrition in mental illness, a proxy would be to compare this prevalence with the general population. This would give an idea of the gravity of this finding in mental patients and the general public. The prevalence of moderate/severe malnutrition among Ethiopian men and women aged 15–59 years was 13.4% in general population. This is in accordance with the Ethiopian Demographic health survey EDHS (2011). Compared with this study, there is evidence that mental illness patients are more susceptible to undernutrition than the general population. Going by the Ethiopian study, it is evident that the prevalence of undernutrition in mental illness is more than twice in the general population. In view of this finding, there is a great need to pay closer attention to this special group of people and identify factors that are peculiar to this group and amenable to reduce the high prevalence of undernutrition. Schizophrenia was observed to have a higher prevalence of undernutrition. The prevalence was at 29. This is still higher than the prevalence of undernutrition in the general population in the developing countries which is estimated at around 13%, (EDHS, 2011). Patients with Schizophrenia have lost touch with reality. Delusions and Hallucinations which may become an energy demanding state that makes them undernourished. Their loss to reality may cause them to eat less or eat unhealthy. Sometimes the Schizophrenic patients are hyperactive that may increase metabolism and ultimately weight loss.

According to the 1992 study by the London School of Hygiene and Tropical Medicine and HelpAge International, the prevalence of undernutrition in Tanzania was 19.5% in men and 13.1% in women while the prevalence in Malawi was 36.1% in men and 27% in women.

Similarly, the current study also found more males (32%) than females (22%) who were undernourished. However, other studies have argued that in general, prevalence rates of undernutrition are rather similar in adult men and women. Nubé M *et.al* (2003) reported regional differences in Africa and Asia. In sub-Saharan Africa communities, the prevalence of BMI is low, on average, a few percent higher in men than in women. In the South and Southeast Asia the reverse is the case. The differences in undernutrition prevalence between men and women are exceptionally large. In this study, it was found that the difference is about 10% between men and women. Furthermore, the study revealed that the odds of being undernourished when male was about two (2) times as women. ($P=0.03$, 95%CI). This may be because males might not have been oriented in preparing meals for themselves while they were young. It may also be because men biologically have a lower fat reserve than women and therefore will weigh less. Additionally, males tend to be taller than women hence having a relatively lower BMI, (Hruschka 2013). It is also true that men tend to abuse alcohol more than women and therefore likely to have a lower BMI, (WHO 2014).

Alcohol abuse disorders had a comparatively higher prevalence of undernutrition among the mental illnesses seen. In this study, they constituted 32% of all undernourished patients. However, 46% of the patients attended to and being treated or followed up for AUD were undernourished. Both acute and chronic alcohol consumption can cause malnutrition by decreasing dietary caloric intake, impairing nutrient digestion and absorption, decreasing protein synthesis and secretion, increasing catabolism of gut proteins, and increasing breakdown and excretion of nutrients. The degree of malnutrition depends on the amount of alcohol consumed, the quality of food intake, genetics, and the presence and severity of comorbid illnesses. The risk of developing micro- and macronutrient deficiencies increases significantly when alcohol makes up more than 30 percent of total caloric intake (Lieber 2000).

Furthermore, the study revealed that the odds of being undernourished when diagnosed and being treated for AUD at Chainama Hills Hospital was about 2.7($P<0.001$ at 95% CI), times as for any other mental illness. AUDs have most times been associated with poor eating habits, poor appetite and from the biochemical point of view, micronutrient deficiencies. Alcohol causes nutritional complications from both its primary effects on the intake and metabolism of nutrients and secondary effects of end organ damage (e.g. alcohol induced liver disease, pancreatitis)

(Bunout, 1999). Additionally, alcohol abusers tend to prioritize alcohol over a good and nutritious meal or any other productive activity such as good hygiene practices. This makes alcohol abusers susceptible to undernutrition. A review of the alcohol abuse related disorders patient's files revealed that they were on detoxification medication. This includes diazepam in tapering doses and vitamin B complex. Others who had psychotic features were on antipsychotic drugs as well. The Common antipsychotic drug used at the institution is Haloperidol with Artane. These drugs have no known risk of causing undernutrition or malnutrition. However, it was difficult to establish in the study whether these drugs or their combination would increase the risk of undernutrition. Alcohol abuse is a problem that we face as a country. Its effects may be subtle, but soon will be a major problem that will be of public health concern. It is thus important to take a step now to prevent the problem from becoming worse.

It was also noted that there is a substantial concurrence of mental disorders and substance use disorders. Taken together, mental, neurological and substance use disorders exact a high toll, accounting for about 13% of the total global burden (WHO-Action plan 2013-2020). Alcohol and other substance abuse were common in this study. Most patients who were being treated for schizophrenia depression or mood disorders had abused alcohol or some substance in the last three months from the time of data collection.

It was observed that the odds of being undernourished among patients being treated for convulsive disorder was 0.2 ($P=0.02$, 95% CI) as for any other mental illness. This implies that being treated for convulsive disorder may be protective from undernutrition compared to the other mental illness types. Recent studies have shown that certain anti-convulsants can cause weight gain. The study by Jallon *et.al* (2001) reports that body weight gain is a common and frequent undesirable effect associated with the use of anticonvulsant drugs. This has been observed for many years with Valproic acid (sodium valproate) and Carbamazepine, and also, more recently, with some of the newer anticonvulsants such as Vigabatrin and Gabapentin. Potential mechanisms of anticonvulsant-associated bodyweight gain are not yet clear and differ between drugs used. The involvement of lowered blood glucose level, which may stimulate eating through an effect on the hypothalamus, constitutes one of the possible mechanisms. Lowered blood glucose levels may result from a competition between the binding of the drug and long chain fatty acids. An increased availability of the latter stimulates insulin production and lowers the serum glucose levels. Another possible explanation for lowered blood

glucose may be a deficiency in carnitine directly caused by the drug that would result in a reduction of fatty acid metabolism and an increase in glucose consumption. An enhancing effect of gamma-aminobutyric acid-mediated neurotransmission may increase appetite for carbohydrates and reduce energy expenditure. This study however did not consider details on the type of anticonvulsants that the patients were taking to determine if there could be the hypothesized interaction at play. Further, patients who have been stabilized on anti-convulsants are more likely to go back to their functional state and contribute positively to their wellbeing and the society (Jallon *et.al*, 2001).

The prevalence of undernutrition among inpatients compared to outpatients was higher. The proportion of undernourished inpatients was 35% compared to outpatients 19%. This compares favorably with findings by Takuro *et.al* (2015), who observed that Japanese inpatients with schizophrenia were more likely to be underweight and have undernutrition than outpatients. According to the study, 17.4% of the inpatients were undernourished whereas that in outpatients was 4.3%. The factors that contribute to this include long duration of hospital stay. There is reduced physical activity when hospitalized and this may result in reduced bone density. Being underweight has been shown to be strongly associated with reduced bone density. This reduced bone density results in reduced weight and ultimately a low BMI. The meals offered to the patients at the institution could be a possible confounder to the results seen. Inpatients were noted to be twice as likely to be undernourished as outpatients. There several possible confounders to this finding. Firstly are the meals that the inpatients have at the institution. These were, however, not thoroughly investigated in this study. It is however reported that the meals comprise mostly of nsima (carbohydrates) and beans (protein) on most days. For proper digestion of food, there is need for other micro-nutrients that serve as co-factors to aid in the metabolism in the diet. These are obtained from green vegetables, fresh fruits and meat products. Another possible confounder is that the patients are likely to have their meals unsupervised judging from the health worker patient ratio. This would result in patients not eating and will go unnoticed. Most of the longest staying inpatients in the study were neglected by their family members and left them to be cared for by the hospital. The care that a family would give to the patient cannot be compared to that given by an institution. Simple tenets of family dynamics and

support can improve not only the mental health state of an individual but also improve the state of general health of mental patients as well as their nutritional state.

Anthropometric measurements are not a routine at the institution. However, some patients were noted to be on nutritional supplements. Participants who were undernourished and were on nutritional supplements were three times more likely to be undernourished than those who were not on any supplements. nutritional supplements were given to patients with overt symptoms of undernutrition but it seems the supplements prescribed do not suffice for the nutritional deficiency or the supplements are not readily available. Nonetheless, British nutrition foundation 2003 bulletin reported that in more than 60% of patients, nutritional status deteriorates during their stay in hospital, with those who are malnourished on admission particularly affected. This therefore indicates the need to consider nutritional status from the onset of illness, admission all through to recovery, including time after discharge. However, undernutrition remains undetected in the majority of patients affected because many clinicians and nurses still do not consider nutrition to be an important factor in the management of disease (Schenker, 2000) and so do not routinely monitor nutritional status and body weight. Economic analysis has demonstrated that appropriate nutritional treatment is cost-effective, but benefits will only be achieved with high standards of nutritional care. Multi-professional nutritional support teams best conduct such treatment but there is continuing evidence of poor practice and a high incidence of treatment-related complications, which negate the benefits of nutritional treatments in the hospital or institutional setting (Schenker, 2000). The problems that cause undernutrition may be compounded by the fact that nutritional considerations may receive little attention from medical and nursing staff. Lack of awareness of the prognostic significance of undernutrition, and lack of knowledge among the doctors and nurses regarding its assessment and management (Nightingale, 1999) may mean that it is neither looked for nor considered when treatment priorities are being set.

In this study, 58% of the participants were single. Only 24% were married. The rest were either divorced (13%) or widowed (5%). Further the study showed that the odds of being undernourished among those that were single was about 2 times more than divorced/widowed who were the reference category. The study also showed that the odds of being undernourished

when married was 28 % less than the reference category. It is possible that if one is or has been married before there is a reduced chance that they would be undernourished. This may be explained in a number of ways. One way is that having a family support system helps to improve the nutrition state. Being married would mean that there is someone close to take care and look out for the other. A partner will encourage the other to eat healthy. On the other hand, having a partner means there is someone to provide good nutritious meal compared with being single. Having been married before also means that there is an eating habit that an individual develops while married and this goes on even after the marriage is ended. It may also imply that when someone is married, there is an element of insight and responsibility that makes them cautious about their nutrition state. It may only be thought that patients with a milder form of the disease will get married and therefore may have a reduced risk of undernutrition (Kvamme, 2011)

Poverty is one of the main causes of malnutrition. According to the Food and Agriculture Organization of the United Nations, malnutrition is part of a whole web of interacting forces such as poor hygiene and sanitation, sickness, ignorance, social practices, gender, low food production, and kinds of crops (Majumdar, 2016). It was observed in this study that hygiene is strongly associated with undernutrition. Poorly kempt patients accounted for 23% of the patients but also accounted for 46% of the undernourished patients. The odds of being undernourished among mental illness patients when poorly kempt is 4 times as those who are fairly kempt. Further the odds of undernutrition among those who are well kempt is 75% less than for those who are fairly kempt. This implies that the poorer the hygiene, the more likely the patient will be undernourished. At multivariate analysis, the odds of being undernourished when poorly kempt was not changed significantly. This may be because poorly kempt patients are susceptible to oral-fecal and other hygiene related communicable diseases that may affect their nutritional wellbeing. These may range from poor absorption of nutrients to bugs that reduce absorption of nutrients, to diarrheal diseases that result in high gastric motility with high fluid output, all resulting in undernutrition. It may also imply that patients that are poorly kempt have no intuition about caring for themselves and do not have any one to take care of them. As such, they are less likely to have a balanced diet or eat a decent meal.

Dongre *et.al*, 2006 studied the impact of school health education program on personal hygiene and related morbidities in tribal school children of Wardha district, in India. The study revealed that poor hygiene is associated with increased morbidity. Increased morbidity results in poor nutrition and ultimately poor health. It is therefore important to encourage good hygiene practices among mental illness patients in order to reduce morbidity and undernutrition. If a mental illness patient is left with poor hygiene, he or she becomes susceptible not only to infectious diseases but also worsening of symptoms of mental illness due to the physiological stress. This further results in poor nutrition and compromised immune system. The patient in this state is less likely to care less for themselves and the cycle becomes vicious.

Level of education was also investigated in the study as a possible factor that contribute or is associated with undernutrition. It was noted that the higher the education level reached by the mental patient, the less likely they were to be undernourished. This was significant before adjusting ($P=0.02$, 95% CI). Even though this was not significant after adjusting at 95% CI, we can infer a relationship from the trend observed. The odds of being undernourished if a patient reached primary, secondary or tertiary education was 0.7, 0.4, 0.3 respectively as the odds when someone had not received any form of education. This implies that education is protective for undernutrition and therefore it would be right to encourage mental patients identified early in life to go to school.

As the country strives to improve health and adopts the 90/90/90 policy on HIV (GRZ, 2016), mental illness patients should not be sidelined. In this study, most (69%) of the study participants knew their HIV status. About 58% were HIV negative and 11% were HIV positive. About 31% did not know their HIV status. All those who knew their status were on anti-retroviral treatment. The proportion of undernutrition among participants that did not know their status was higher. Therefore, knowing the HIV status in mental illness patients may help to reduce undernutrition. The odds of being undernourished if HIV positive were 0.86 times as those who did not know their status. The odds of being undernourished when HIV- negative were 0.83 times as those who did not know their status. Form this study, it is clear that knowing the HIV status in mental illness patients is protective against undernutrition. HIV left untreated will cause wasting as is seen in the WHO Staging for HIV. (Kumar 2011). Further, fear to know the status may also result in stress and this physiological stress can interfere with metabolism and result in

undernutrition. It is from this point that we should continue to include mental illness patients in the fight against HIV if we are to achieve lasting results.

Although the majority of mental illness patients seen came from poor communities, it would be incorrect to infer that mental illness is a disease for the poor because it may also be true that the affluent are being attended to in private institutions because they can afford. It is also of note that only a few of the participants were coming from out of town. This means that there is a gap with regards to mental health care provision in the provinces. There is a need to build well established mental health centers and train more psychiatrist to carter for the deficit in the provinces.

CHAPTER 7

7.1 STUDY LIMITATION

The sample sizes were relatively small in some mental illness types. This could not be controlled as the patients were seen as they came through. This made it difficult to draw holistic conclusion when comparing all the mental illnesses. Nonetheless there is an obvious observation among patients with schizophrenia AUDs that they have a higher prevalence of undernutrition. These two mental illness types had a high number of participants in the study.

Another limitation to this study was that we could not evaluate the changes in weight and nutritional status with time as the study was cross-sectional. A prospective Cohort in the study design would help to overcome this limitation.

Furthermore, the period the medication had been taken and the type of medication was not very clear. In some patients, medication was changed several times. It was also noted that most of the patients were not on monotherapy. It was therefore difficult to analyze the effects of drugs on undernutrition in the participants. The use of different medication within the period of illness to treat different symptoms made evaluation of the effects of the medication on BMI difficult. Therefore it was not easy to deal with medication as a confounder in the study.

The eating behavior, type of diet or amount and frequency of food taken, were not investigated in detail in the study. Such detail would have helped to explain the effects of these factors on BMI.

The study also did not include biochemical parameters such as serum levels of cholesterol, protein and other micronutrient levels which are typically used in clinical and laboratory assessment of undernutrition status.

Getting consent from patients whose immediate care giver had not been seen in a while at the hospital presented a challenge. This ethical concern, somehow denied the patient an intervention that would help in their treatment outcome. This was a limitation, however, patients who were noted to be obviously undernourished but eligible to participate in the study, were sent to the local nutritionist for evaluation and treatment. This was achieved through the nurse working in the respective wards at the time of data collection.

7.2 CONCLUSION

The prevalence of undernutrition in mental illness patients at Chainama Hills Hospital in this study is 29%. This higher than that found in the general population. This indicates that Mental illness patients are at high risk of undernutrition and there is need to approach undernutrition with the urgency it deserves. The right to a well-nourished life among the cognitively impaired may be hampered if this is not dealt with. The prevalence of undernutrition among Mental illness if reduced would contribute to a decline in morbidity among mental illness patients.

Alcohol use disorders are strongly associated with undernutrition, while convulsive disorders are protective of undernutrition. This result highlights the need for clinicians to identify and treat undernutrition among alcohol related disorders. Furthermore, there is need to make anthropometric measurements a routine at the institution. This will help to have patient centered treatment for undernutrition in mental health, resulting in addressing nutrition concerns and reducing morbidity. The challenge with cross sectional studies is that the polarity of the relationship between undernutrition and alcohol abuse related disorders is not known and therefore there is need for a much wider study on the subject.

Socio-demographic factors associated with undernutrition include male gender, low level of education, low socio-economic status, marital status and admission in the hospital. Other factors associated with undernutrition in mental illness patients are poor hygiene, use and abuse of other drugs, and the presence of pellagra.

7.3 RECOMMENDATION

A much wider study should be conducted to consider geographical location. Further, the study should look at the micronutrient deficiencies in mental illness patients as evidenced by essential nutritional markers in serum. Additionally, the study should also investigate the nutritional changes in mental illness, over time and its covariates.

It is important that all mental illness patients have vitals and basic anthropometric measurements such as weight height and BMI at the point of contact with the health worker. This will ensure that undernutrition is identified early and treated with the urgency it deserves.. All patients admitted in the hospital should have anthropometric measurements taken. This will help identify undernutrition timely and offer the appropriate intervention. Eventually this will help to reduce the morbidity associated with undernutrition in mental illness.

Low socio-economic status and low education level are associated with undernutrition. Therefore, we should encourage developing special schools for children with mental illnesses. Further, we should encourage people to get an education, this will not only improve the socio-economic status but also reduce on the number of people that abuse alcohol. Thereby, reducing alcohol abuse related psychiatric disorders and undernutrition in mental illness

It is important to have qualified nutritionists at the institution to treat and attend to patients as they come for services. During the study, the institution had one nutritionist against the great deal of patients. We recommend increasing the number of nutritionists at the mental institution so that the patients receive the required attention. . Additionally, it critical to have a deliberate policy to support provision of enough nutritious food and supplements for the undernourished mental patients at the hospital. The variety of the diet for mental patients at the institution is limited and this may contribute to the higher prevalence among in patients than outpatients. Improving the variety of foods may improve the nutritional status of the patients. Finally, it important to encourage good hygiene practices among patients with mental illness. Hygiene was strongly associated with undernutrition. Good hygiene practices like hand washing and eating freshly cooked food as well as daily baths and good toilet habits will improve the hygiene and thereby reduce undernutrition.

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ANNEXES

ANNEX 1: QUESTIONNAIRE

ID#	DATE	SITE
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1. DEMOGRAPHY/SUBJECT CHARACTERISTICS

AGE		NEXT OF KIN (RELATIONSHIP)		
RESIDENCE				
<i>SOCIAL ECONOMIC STATUS</i>		low <input type="checkbox"/>	medium <input type="checkbox"/>	high <input type="checkbox"/>

a. *SEX*

<input type="checkbox"/>	MALE
<input type="checkbox"/>	FEMALE

b. *MARITAL STATUS*

<input type="checkbox"/>	SINGLE
<input type="checkbox"/>	MARRIED

- DIVORCED/SEPARATED
 WIDOWED

c. *LEVEL OF EDUCATION*

- NO EDUCATION
 PRIMARY
 JUNIOR SEONDARY
 SECONDARY
 TERTIARY

d. *OCCUPATION*

- EMPLOYED
 NOT EMPLOYED

PAST MEDICAL HISTORY

- HIV STATUS H/O CHRONIC INFECTION LIKE TB IN THE
LAST 1 YEAR
 MALIGNANCY OR CHEMOTHERAPY FREQUENCY OF GASTROENTERITIS
IN THE LAST 3 MONTHS
 OTHER CO-MORBID CONDITION, IF YES SPECIFY

SOCIAL HISTORY

- | Abuse of | duration |
|------------------|-----------------|
| - Alcohol | |
| - Smoking | |
| - Drugs of abuse | |

CURRENT MEDICATION/MEDICATION IN THE LAST 3 MONTHS

-
-
-

FOOD SUPPLEMENTS IN THE LAST 3 MONTHS

-

CLINICAL ASSESMENT

MENTAL ILLNES BEING TREATED FOR (DIAGNOSIS)

DATE OF DIAGNOSIS

NUMBER OF ADMISSIONS IN THE LAST ONE YEAR

DURATION OF LONGEST STAY IN HOSPITAL

SEVERITY OF MENTAL ILLNESS

SEVERE REQUIRING ISOLATION IN ADMISSION OR CLOSE SUPERVISION

MODERATE REQUIRING ADMISSION BUT NO ISOLATION

MILD REQUIRING FREQUENT REVIEWS TO THE PSYCHIATRIST AS AN OUTPATIENT

CLINICAL EXAMINATION

GENERAL HYGIENE

WEIGHT

HEIGHT

BMI

DERMATOSIS

OEDEMA

HAIR CHARACTERISTIC

PALLOR

MUSCLE BULK

ORAL ULCERS

OTHER- SPECIFY

ANNEX 2: PATIENT INFORMATION SHEET AND CONSENT FORM

Introduction

My name is Mazuba Makamo and I am a student at the University of Zambia, School of medicine, in the department of public health. I am currently conducting my research project as a pre-requisite to attainment of my qualification as well as adding information to the body of knowledge. The main supervisor for the study is Dr. P. Bwembya.

Aims of the study

The study will determine the prevalence of undernutrition in mentally ill patients then assess the association between undernutrition and mental health. The study aims further to identify the nutritional deficiency that is common in undernourished mental patients in Lusaka

Study procedures

As a participant in this study, the following will be done;

- I. Your BMI will be measured (height and weight)
- II. You will be asked a few questions over your diet and the frequency of admissions to the mental health facility.

Length of study

We will spend roughly about 10 minutes or more to ask you a few simple questions, then we will spend not more than 5 minutes to measure your BMI as well as examine you for malnutrition. This means we will spend in total about 15 minutes to complete data collection.

Confidentiality of the study records.

The information and data collected in the study will be kept confidential and accessible only through the principle investigator, Dr. Mazuba Makamo or the supervisor, Dr. P. Bwembya. No names will be recorded but numbers and at most initials for identity. Hard copies of the data will be kept under a locked cabinet and another soft copy of the data will be kept in 3 different hard drives only accessible to the PI and the supervisor. The data will be kept for 3 years and thereafter may be destroyed.

Risk of participating in the study

There is no known risk to participating in the study.

Benefits of participating in the study

Patients who are participating in the study, and found to be undernourished will be referred to the nutritionist in the institution so that they are attended to and treated. Furthermore, the information obtained from the study will help improve the treatment of mental illness patients with undernutrition. Such interventions as deliberate nutritional supplementation in the daily diet of mental illness patients is sought for in this study.

Rights

Your participation in the study is voluntary and you have the right to withdraw from the study at any point of your convenience.

Clarifications

If you have any questions or clarifications about the study, you can get in touch with

The Principle Investigator
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mazubamakamo@gmail.com

Or you can get in touch with my main Supervisor

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Lusaka.

For ethical concerns, get in touch with

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Email: eresconverge@yahoo.co.uk

ANNEX 3: IMMEDIATE CARE GIVERS INFORMATION SHEET AND CONSENT FORM

Introduction

My name is Mazuba Makamo and I am a student at the University of Zambia, School of medicine, in the department of public health. I am currently conducting my research project as a pre-requisite to attainment of my qualification as well as adding information to the body of knowledge. The main supervisor for the study is Dr. P. Bwembya.

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The study will determine the prevalence of undernutrition in mentally ill patients then assess the association between undernutrition and mental health. The study aims further to identify the nutritional deficiency that is common in undernourished mental patients in Lusaka

Study procedures

The following will be done on the participants (the patient you are caring for) in this study:

- I. His/her BMI will be measured (height and weight)
- II. You will be asked a few questions over his diet and the frequency of his/her admissions to the mental health facility.

Length of study

We will spend roughly about 10 minutes or more to ask you a few simple questions, then we will spend not more than 5 minutes to measure the participants BMI as well as examine for malnutrition. This means we will spend in total about 15 minutes to complete data collection on an individual participant.

Confidentiality of the study records.

The information and data collected in the study will be kept confidential and accessible only through the principle investigator, Dr. Mazuba Makamo or the supervisor, Dr. P. Bwembya. No names will be recorded but numbers and at most initials for identity.

Hard copies of the data will be kept under a locked cabin and another soft copy of the data will be kept in 3 different hard drives only accessible to the PI and the supervisor. The data will be kept for 3 years and thereafter may be destroyed.

Risk of participating in the study

There is no known risk to participating in the study.

Benefits of participating in the study

Patients who are participating in the study, and found to be undernourished will be referred to the nutritionist in the institution so that they are attended to and treated. Furthermore, the information obtained from the study will help improve the treatment of mental illness patients with undernutrition. Such interventions as deliberate nutritional supplementation in the daily diet of mental illness patients is sought for in this study.

Rights

Participation in the study is voluntary and you have the right to refuse or withdraw the patient from participating from the study at any point of your convenience.

Clarifications

The Principle Investigator
DR. Mazuba Makamo
+260977482939
mazubamakamo@gmail.com

The Main supervisor
DR. P. Bwembya
UNZA SOM
Department of Public health
Lusaka.

For ethical concerns, get in touch with
ERES Converge
33 Joseph Mwilwa Road
Lusaka
+260966765503/+260955155633
Email: eresconverge@yahoo.co.uk

ANNEX 4: CONSENT FORM

**TITLE: ASSOCIATION BETWEEN UNDER NUTRITION AND MENTAL HEALTH IN
LUSAKA**

PRINCIPLE INVESTIGATOR: Dr. Mazuba Makamo

SUPERVISOR: Dr. Phoebe Bwembya

I confirm that I have read and understand the patient information sheet dated for the above study. I understand that my participation is voluntary and I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. I understand that sections of any of my medical notes and data collected during the study, may be looked at by responsible individuals from the University of Zambia School of medicine, department of public health, from regulatory authorities or from the Ethics board, where it is relevant to my taking part in this research. I give permission for these individuals to access my records. I agree to my psychiatrist being informed of my participation in the study.

I agree to take part in the above study.

_____	_____	_____
Name of Participant	Signature	Date
_____	_____	_____
Name of immediate caregiver (If patient not in right state to consent)	Signature	Date
_____	_____	_____
Name of Person taking consent (If different from Principal Investigator)	Signature	Date
_____	_____	_____
Principal Investigator	Date	Signature

1 copy for participant; 1 copy for Principal Investigator; 1 (original) copy to be kept in hospital note.

ANNEX 5: CLEARANCE LETTERS



THE NATIONAL HEALTH RESEARCH AUTHORITY
C/O Ministry of Health
Haile Selassie Avenue,
Ndeke House
P.O. Box 30205
LUSAKA

*In response please quote
No. MH/101/23/10/1*

13 February, 2017.

Dr. Mazuba Makamo
University of Zambia
School of Medicine
P. O. Box 50110
Lusaka.

Dear Dr. Makamo,

Re: Request for Authority to Conduct Research

The National Health Research Authority is in receipt of your request for authority to conduct research titled “The Association Between Under-Nutrition and Mental Health in Lusaka at Chaimama Hills Hospital and University Teaching Hospital Psychiatry Clinic”.

I wish to inform you that following submission of your request to the Authority, our review of the same and in view of the ethical clearance, the Authority has granted you authority to carry out the above mentioned exercise on condition that:

1. The relevant Provincial and District Health Directors where the study is being conducted are fully appraised;
2. Progress updates are provided to the Authority quarterly from the date of commencement of the study;
3. The final study report is cleared by the Authority before any publication or dissemination within or outside the country;
4. After clearance for publication or dissemination by the Authority, the final study report is shared with all relevant Provincial and District Health Directors where the study was being conducted, and all key respondents.

Yours sincerely,

Mrs. A. Ngomah-Moraes
For/Director