

# **NUTRITIONAL AND PSYCHOLOGICAL IMPACT OF DIABETES ON DIABETICS: CASE STUDY IN THE TAMALE TEACHING HOSPITAL - GHANA**

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## **Abstract**

This study sought to assess the role of diabetes on food intake and the psychological impact of living with diabetes among diabetics in the Tamale Teaching Hospital. A self structured questionnaire was administered among 97 sampled diabetic respondents at the diabetic clinic in the Tamale Teaching Hospital. The studies found out that diabetes does have a role to play on the food intake of diabetics in the Hospital.

It was also found out that generally a healthy meal plan for the diabetic respondents is the same as a healthy diet for anyone. The outstanding difference in the food intake of the diabetics in the hospital was their no or limited intake of sugar which sometimes was substituted with honey. Mean individual dietary diversity score of 5.37 was obtained reflecting that the dietary diversity score for diabetics did not meet the optimum level ( $\geq 6$ ). Male and Female diabetic respondents had mean FCS of 22.95 and 22.12 respectively which falls within the borderline food consumption category.

On the psychological impact of diabetes, this studies found out that all diabetic respondents had the risk of post traumatic stress disorder (PTSD); about four out of every six diabetic respondents had 75% chance of being diagnosed with post traumatic stress disorder as a result of living with diabetes while one out of every six diabetic respondents had the greatest chance (above 75%) of being diagnosed with PTSD.

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**Keywords:** Diabetes, food intake, psychological impact, Tamale Teaching Hospital

## **Introduction**

In Ghana, like many developing countries, the erosion of traditional lifestyles to adopt western lifestyles is largely causing lifestyle – induced diseases such as Diabetes. In addition, the high prevalence of diabetes in developing countries is attributed to under nutrition, over nutrition and a shift from the consumption of traditional food to more processed, polished and animal sourced foods with high fats and sugar contents (Beecham, 2007). Excess body fat as it is stated by Kopelman et al (2005) underlies 64% of cases of diabetes in men and 77% of cases in women. A number of dietary factors such as sugar sweetened drinks (malik et al, 2010) and the type of fat in the diet appear to play a role (Risérus et al, 2009).

Obesity has been found to contribute to approximately 55% of cases of type 2 diabetes (Eberhart et al, 2004). Shoelson et al (2006) has it that chronic obesity leads to increased insulin resistance which can develop into type 2 diabetes. Kopelman et al (2005) supports this by adding that a number of lifestyle factors are known to be important to the development of diabetes mellitus type 2 includes: obesity, physical activity, diet, stress, and urbanization.

It is however interesting to note that changing lifestyles and diet lead to diabetes and diabetes in turn changes the lifestyles of diabetics. This makes the whole issue of diabetes, lifestyle and diet a complicated web.

## **Problem Statement**

In Ghana as in other developing countries, diabetes is threatening the lives of 50 percent of patients in the country. About 2.2 million Ghanaians already suffer from the disease. The Ghana Diabetes Association estimates that one person dies every 10 seconds due to diabetes and can also lead to a number of potentially serious, life-threatening complications. These include amputation, impotence, stroke, heart attack and blindness (Beecham, 2007).

Thus much attention is given to the management of Diabetes of which dietary management plays a major role. These admonitions has led to either sticking to or avoidance of certain foods which may be the realities of the dietary management or mere perceptions of the patient but little is documented about the influence of diabetes on the food intake of the patient. In the same vain little is documented on the psychological influence/impact of the disease on patience since one's mind state is very crucial in the management of the disease and on food intake.

It is in view of this, that this research sought to study into the role of diabetes on food intake among diabetics and the psychological impact of

diabetes on diabetics in the Tamale Teaching Hospital. The out come of this study aims at contributing to scientific literature as well as aid Nutritionists and Dietitians in the management of their patients.

### **Research Questions**

The study sought to answer these questions:

- Does diabetes influence food intake?
- What are the dietary patterns of diabetics?
- What foods do diabetics avoid?
- Does being diabetic have any relationship with the risk of post traumatic disorder?

### **General Objective**

The main objective of the study is to assess the role of diabetes on food intake among diabetics and the psychological impact of diabetes on diabetics

### **Specific Objectives**

- To identify the influences of diabetes on food intake.
- To assess the diet patterns of diabetics
- To identify the foods diabetics avoid
- To ascertain the risk of post traumatic disorder among people living diabetes

### **Literature Review**

#### **Introduction**

Diabetes mellitus is a disorder that affects the body's ability to make or use insulin. Insulin is a hormone produced in the pancreas and it helps in the transportation of glucose from the bloodstream into the cells to be broken down and used as fuel. It is impossible for humans to live without insulin (ADA, 2007). Diabetes results in abnormal levels of glucose in the bloodstream which could cause severe short-term and long term consequences ranging from brain damage to amputations and heart disease (ADA, 2007). Diabetes mellitus, or simply diabetes, is a group of metabolic diseases in which a person has high blood sugar, either because the pancreas does not produce enough insulin, or because cells do not respond to the insulin that is produced (Dolores, 2011)

Alemzadeh (2011) has it that diabetes can be caused by too little insulin, resistance to insulin, or both. It is further mentioned that diabetes is a life-long disease marked by elevated levels of sugar in the blood. Samreen (2009) has it that diabetes is the second leading cause of blindness and renal

disease worldwide. He further mentions that diabetes mellitus is a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas, or by ineffectiveness of the insulin produced. It is a silent killer disease and affects millions of peoples in the world.

WHO estimates that more than 180 million people worldwide have diabetes. This number is likely to be more than double by 2030 without urgent action. In 2005, an estimated 1.1 million people died from diabetes, almost 80% of them occur in low and middle-income countries, and half of in people under the age of 70 years; 55% of diabetes deaths are in women. The need for better coordination of efforts on diabetes across the African region by supporting the development of comprehensive national non communicable diseases plans including diabetes and collaboration amongst all stakeholders in order to build on existing accomplishments and avoid duplication of efforts is critical (WHO, 2008 as cited by Sierra, 2009).

### **Diabetes in Africa**

Diabetes was considered a rare disease in sub-Saharan Africa until about 40 years ago. According to Sierra (2009), between 1960 and mid-1985, the prevalence of diabetes was around 1% for a number of countries, including Ethiopia, Ghana, Lesotho, Uganda, and Malawi. There were however two exceptions, Ivory Coast (5.7%) and South Africa (2.2–2.7%).

Contrary to the above, he further mentions that moderate prevalences were reported for the same period for some areas in South Africa (4–8%). The differences were said to be largely due to higher rates of obesity among the South African population as compared with other countries in the region.

The major risk factors for diabetes in sub-Saharan Africa are not different from those in other regions of the world; urbanisation, obesity, physical inactivity, increasing age and ethnicity. The rising prevalence of diabetes in the region has largely been attributed to changes in lifestyle and urbanisation, resulting in greater levels of obesity and physical inactivity (Sierra, 2009).

Sierra concludes by saying that obesity was traditionally uncommon in many parts of the region, largely due to scarcity of food and high levels of energy expenditure. It is however interesting to note that cultural perceptions of body size are of important concern as in many of these countries a large body might be associated with wealth, attractiveness, health, and happiness.

### **Incidence of Diabetes Mellitus**

The incidence of diabetes has soared worldwide in recent years according to Ahmed et al (2012) and that it is expected to keep growing, with the greatest increase seen in metabolic forms of diabetes, notably type 2. This they blamed largely on the rise of obesity and the global spread of

Western-style habits: physical inactivity along with a diet that is high in calories, processed carbohydrates and saturated fats and insufficient in fiber rich whole foods.

According Samreen (2009), the aging of the population is also a factor. He however points out that, other factors, such as environment may also be contributing, because cases of autoimmune diabetes (type 1) are also becoming more common. Samreen further mentions that according to the International Diabetes Federation, the estimated number of people with diabetes has jumped from 30 million in 1985 to 150 million in 2000 and then to 246 million in 2007. It is however estimate further by Shaw et al (2010) that a worldwide prevalence among adults aged 20 -79 years would increase from 285 million in 2010 (6.4%) to 439 million in 2030 (7.7%).

### **Management of Diabetes**

There is currently no cure for diabetes. The condition, however, can be managed for patients to live a relatively normal life. Treatment of diabetes focuses on two goals: keeping blood glucose within normal range and preventing the development of long-term complications. Careful monitoring of diet, exercise, and blood glucose levels are as important as the use of insulin or oral medications in preventing complications of diabetes (Altha, 2002).

Diet and moderate exercise are the first treatments implemented in diabetes. For many Type II diabetics, weight loss may be an important goal in helping them to control their condition (ADA, 2007).

**Prevention Methods for Diabetes:** Diabetes can or cannot be prevented depending on the type. For type 1 and latent autoimmune diabetes of adulthood or genetic conditions such as maturity-onset diabetes of the young and Wolfram syndrome, there is still no known prevention route. The risk of type 2 and gestational diabetes can however be reduced by focusing on managing weight through regular exercise and a healthy diet. It is also worthy to control one's blood pressure and cholesterol, avoid smoking and restrict alcohol in the bid to avoid the risk of diabetes. Even though there is still no cure for diabetes which was once a death sentence, it has now become a chronic condition that can be managed (Naila et al, 2009).

### **Diet and Diabetes**

A combination of healthy diet and appropriate exercise leading to weight loss consistently reduce the incidence of diabetes. It is however uncertain as to whether dietary changes alone play a significant role in preventing diabetes (Salas-Salvado et al, 2010).

Salas-Salvado and colleagues concluded that there is no universal dietary strategy to prevent diabetes or delay its onset. They however

maintain that the maintenance of ideal body weight, the promotion of the so-called prudent diet (characterized by a higher intake of food groups that are generally recommended for health promotion, particularly plant-based foods, and a lower intake of red meat, meat products, sweets, high-fat dairy and refined grains) or a Mediterranean dietary pattern rich in olive oil, fruits and vegetables, including whole grains, pulses and nuts, low-fat dairy, and moderate alcohol consumption (mainly red wine) appears as the best strategy to decrease diabetes risk.

It is also worth noting that few researches have focused on diabetes prevention with diet (Mann et al 2004; Bantle et al, 2008) however there is compelling evidence that diabetes can be prevented or its onset can be delayed by lifestyle interventions (Pan et al, 1997). Some researches have also been nutrient specific by looking at the role of diet in diabetes prevention with emphasis on carbohydrates and dietary fats (Buyken et al, 2010; Spence et al, 2010 and Rise'rus et al, 2009).

**Weight and the Risk of Diabetes:** Body weight is a very crucial modifiable risk factor for the development of diabetes, incidence of diabetes obviously rises as obesity prevalence increases (Mokdad et al, 2001). Lindstro'm et al (2006) are however uncertain as to whether diet or exercise alone plays a vital role in preventing diabetes. Individuals who increase structured leisure-time physical activity to moderate-to-vigorous or strenuous are less likely to develop diabetes (Laaksonen et al, 2005). The base line here is that excess weight gain predisposes one to the risk of diabetes.

### **Effect of Some Foods on Diabetes Prevention**

**Coffee and Tea:** The role of coffee in diabetes for now is not so certain; a strong inverse association between coffee consumption and diabetes risk has been reported by Van Dam et al (2002). A similar and a stronger inverse association was reported by Huxley et al (2009) for decaffeinated coffee. Having these views on board, the effect cannot be attributed to caffeine. The protective mechanism has not been fully understood yet. Campos et al (2007) are therefore of the view that the likely roles for chlorogenic acid or lignans contained in coffee warrants further research.

**Alcoholic Beverages:** The role of alcohol use and diabetes is very confusing as we have conflicting evidence in this area. Moderate alcohol consumption is said to be protective for type II diabetes in men and women (Sesso et al, 2008; Ikehara et al, 2008). Other studies however have it that total alcohol intake is associated with reduced risk only in women and not in men (O' Dea, 2006)

**Milk and Dairy Products:** Tremblay et al (2009) in their studies suggested that dairy products being good sources of calcium and magnesium

could be protective of diabetes because of the role these nutrients play in insulin resistance. The studies of Elwood et al (2008) supports the above as it found lower risk of diabetes associated with high milk intake.

**Fruits and Vegetables:** Increased intake of fruits and vegetables is generally well known to reduce the risk of obesity and cardiovascular diseases. However some studies by Hamer et al (2007) did not suggest that fruit and vegetable consumption may lower the risk of diabetes.

**Eggs:** High amounts of daily consumption of eggs is said to increase one's risk of diabetes (Djousse´ et al, 2009). In an earlier study Hu et al (1999) supported this by saying that the amount of eggs per day should be limited to prevent the risk of diabetes.

**Dietary Pattern:** Dietary patterns are the best approach to ascertaining the role of diet on the risk of diabetes instead of relying on single nutrient since synergistic or antagonistic effects may exist between the different components of a food pattern (Jacobs et al, 2009). As put by Salas-Salvado´ et al (2010) that healthy lifestyle of combining healthy diet and appropriate exercise leading to weight loss consistently reduce the incidence of diabetes since it is uncertain as to whether dietary changes alone play a significant role in preventing diabetes.

**Diabetes and Post- Traumatic Stress Disorder (PTSD):** Post-Traumatic Stress Disorder is usually a prolonged stress response syndrome involving symptoms that develop as a result of stressful life events usually of an extraordinarily threatening or catastrophic by nature. Symptoms of PTSD include flashbacks, nightmares and severe anxiety, as well as uncontrollable thoughts, intrusive memories, avoidance and numbing, or emotional arousal (Nadamuni, 2013).

Nadamuni (2013) has it that strong evidence shows that PTSD leads to a significant risk of developing type 2 diabetes. An earlier study published by research activities (2012) supports this view by indicating that there is a growing evidence of PTSD posing a high risk of developing diabetes. The reverse however is not certain - little research has been conducted in this regards.

## **Materials And Methods**

**Study Design:** A cross-sectional study was used as it was deemed appropriate for seeking the role of diabetes on food intake among diabetics and the psychological impact of diabetes on diabetics. The Target Population for the study was all diabetics in Tamale Teaching Hospital. A Sample size 92 was obtained using Snedecor and Cochran 1989 formula with 5% contingency added to give a total sample size of 97 as the study population. Diabetic respondents were sampled using systematic sampling method from the Tamale Teaching Hospital diabetic register.

**Data Collection:** The study used both open and closed ended questions in its questionnaire. This was used to collect data on diabetics' experiences of living with diabetes and how confident they were in following recommended dietary patterns. A 24 hour dietary recall and a dietary diversity score questionnaires were equally administered to aid in ascertaining the foods diabetic respondents consume. Respondents were also engaged in one-on-one interview.

**Food Consumption Score (FCS):** The FCS calculated for the diabetics aimed at capturing as much differentiation as possible along with different consumption patterns. The FCS was calculated by the weighted frequency (days per week) of a diabetics' consumption of different food groups. The consumption frequency of different food items within the same food group were added together (to a maximum of 7) and the value obtained was then multiplied by its assigned weight. The food consumption score was then computed as the sum of the weighted food groups.

**Individual dietary diversity score (IDDS):** As dietary diversity measures, simple count of individual food groups (IDDS) were used. IDDS counted all the food items consumed over the previous 24-hours of the survey date.

In computing the IDDS, the food groups considered in the score for the IDDS put more emphasis on micronutrient intake rather than economic access to food. For this reason, the IDDS excludes the last two food groups: Sweets, and Spices, condiments and beverages as suggested by Steyn et al (2006). Dietary diversity score was calculated by summing the number of unique food groups consumed during the previous 24 hours as described by Krebs-Smith et al (1987).

Food groups considered were cereals, vitamin A rich vegetables and tubers, white tubers and roots, dark green leafy vegetables, other vegetables, vitamin A rich fruits, other fruits, organ meat (iron rich), flesh meat, eggs, fish, legumes nuts and seeds, milk and milk products, oils and fat. If any of the diabetic respondent ate any quantity of any food group at least once per day, it was taken into account. Fourteen food groups for the IDDS were adapted. One of the limitations of this research is that it excluded the counting of food groups such as sweets, and spices, condiments and beverages.

**Psychological impact Assessment:** Impact of Event Scale (IES) was employed, it is a tool often used to measure the psychological impact of an event on an individual. In measuring the psychological impact of diabetes on diabetics, Horowitz, Wilner, and Alvarez scale of 1979 was adopted. A set of fifteen statements were made for diabetics to tick the responses that is applicable to them with corresponding values (0 – 5) for each question. The responses were *not all, rarely, sometimes and often* for the corresponding

values of 0, 1,2,3,4 and 5. A score between 9 – 25 means that the thought of being diabetic may affect the respondent psychologically. A score of 26 – 43 means there exist a powerful psychological impact of being diagnosed diabetic and such an individual is certainly affected psychologically as a result of the fear attributed to being diabetic. While a score of 44 – 75 means a severe impact, this is capable of altering the individual's ability to function.

Scores above 26 are very important and proper attention should be given to such individuals while a score between 0 – 8 means there is no meaningful impact on the individual.

It is worth noting that a score of 27 or more indicates that there is a 75% chance that the individual has Traumatic Stress Disorder – PTSD (Coffey, 2006) as a result of being diagnosed diabetic (living with diabetes). Those who do not have full PTSD may have partial PTSD or at least some of the symptoms.

A score of 35 or above however indicates the best cutoff for a probable diagnosis of PTSD (Neal et al, 1994) and such an individual should *consider consulting a mental health professional who is skilled in treating such issues*

**Data Handling:** On receiving the data, the data was cleaned, coded and analyzed. In ensuring quality double data entry with blind verification was done to minimize entry errors.

**Ethical Consideration:** Permission was sought from the authorities of Tamale Teaching hospital to conduct the research as well as the consent of the participants. In ensuring confidentiality names and personal details were not taken.

**Statistical Analysis:** Data was analyzed using the Statistical Package for Social Sciences (SPSS) and Microsoft Excel. Queries were generated and answered accurately in the process of analysis.

## **Results**

The results indicate the characteristics of the various diabetic respondents, their experience of living with diabetes and dietary patterns.

### **Respondents' Demographic Characteristics**

The characteristics of the respondents did influence the results. A presentation of a descriptive data of the diabetic respondents and the effect on the role of diabetes on food intake is shown below.

**Gender of respondents:** The gender of the respondents had fair representation of both males and females; however the proportion of males were slightly higher than that of females. 54.6% of the respondents were males (53) whilst females (44) constituted 45.4% of the respondents. This

fair representation means that the impact of gender on the role of diabetes on their food intake is uniformly distributed.

**Age of Respondents:** 9.3% of the respondents (9) were below the age of 30, 10.3% (10) were between the ages of 30 and 39, 22.7% of them (22) were between the ages of 40 and 49 years. Also 40.2% of the respondents (39) fell between the ages of 50-59 years. Also respondents (17) who were above 60 years also constituted 17.5% of the total diabetic respondents.

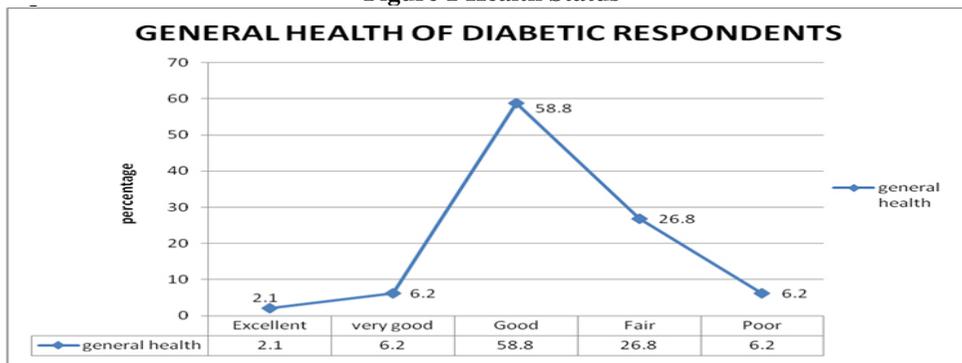
Cumulatively 80.4% of the total respondents are aged 40 years and above. This group may be considered as the most prevalent age group of type 2 diabetes in the Tamale metropolis since all the respondents had type 2 diabetes.

**Education level of respondents:** 18.6% of the respondents (18) did not have any form of formal education. 17.5% of the diabetic respondent (17) had the opportunity to be in the primary school whilst 19.6% of the respondents (19) attended junior high school. A greater proportion of the respondents (31) comprising 32.0% are senior high school levers.12.4% of the respondents (12) are college and university graduates.

**Marital status of respondents:** More than half of the respondents were married, precisely 77.3% while 9.3% of them were single. Also the proportions of separated and divorced respondents constituted 1.0% and 3.1% respectively, while those widowed comprised 2.3% of the respondents. Cumulatively, a greater majority of our respondents were married persons.

**Occupation of respondents:** The below give details of the occupation of the respondents; civil servants (11) comprised 11.3%, businessmen and women (40) consist of 41.2% and 13.4% represent the non-working (unemployed) respondents (13). 34% of the respondents (33) comprise others who are engaged in other occupations not group here which mainly include farming, carpentry, driving, barbering, and hairdressing among others.

**Figure 1 Health Status**



Source: research team field data, 2013

Figure 1 indicates responses from the diabetic respondents as to how they see their health generally if asked. More than half of the respondents (57), which constitute 58.8%, see their health as good. 26.8% of the diabetic respondent (26) described their general health as fair. Also a 6.2% of the diabetic respondents (6) see their general health as very good with 2 and 6 diabetic respondents which constitute 2.1% and 6.2% describing their general health as excellent and poor respectively. The greater proportion of the diabetic respondent with their general health posed as good can be explained as that, diabetes can be managed upon careful weight reduction and dietary management regimes.

**Table 1: Confidence in preparation and sharing diet with non diabetics**

Confidence to prepare and share diet with non diabetic	Frequency	Percentage
not at all confident	4	4.1
slightly confident	29	29.9
moderately confident	29	29.9
very confident	35	36.1
Total	97	100.0

*Source: research team field data, 2013*

From the table above, fewer [4.1%] respondents are not at all confident to prepare and share their diet with non diabetics. 29.9% are both slightly and moderately confident to prepare and share their diet with non diabetics. However, most [36.1%] of the respondent are very confident to prepare and share diet with non diabetics.

**Table 2: Confidence in choosing appropriate foods when hungry**

Confidence to choose appropriate foods to eat	Frequency	Percent
not at all confident	1	1.0
slightly confident	12	12.4
moderately confident	45	46.4
very confident	39	40.2
Total	97	100.0

*Source: research team field data, 2013*

Table 2 above shows how confident the respondent can choose the appropriate food to eat when hungry. 1% and 12% of the respondents are not at all and slightly confident. 46.4% are moderately confident whilst 40.2% are also very confident to choose the appropriate food to eat when hungry.

**Table 3: Confidence in controlling diabetes**

Confidence to control diabetes to avoid interference with other activities	Frequency	Percent
not at all confident	3	3.1
slightly confident	20	20.6
moderately confident	53	54.6
very confident	21	21.6
Total	97	100.0

Source: research team field data, 2013

From the table 3, 3.1% of the respondents are not at all confident to control their diabetes so that it does not interfere with the things they want to do. Also, 20.6% and 21.6% are slightly and very confident respectively. However 54.6% are moderately confident to control their diabetes so that it does not interfere with things they want to do.

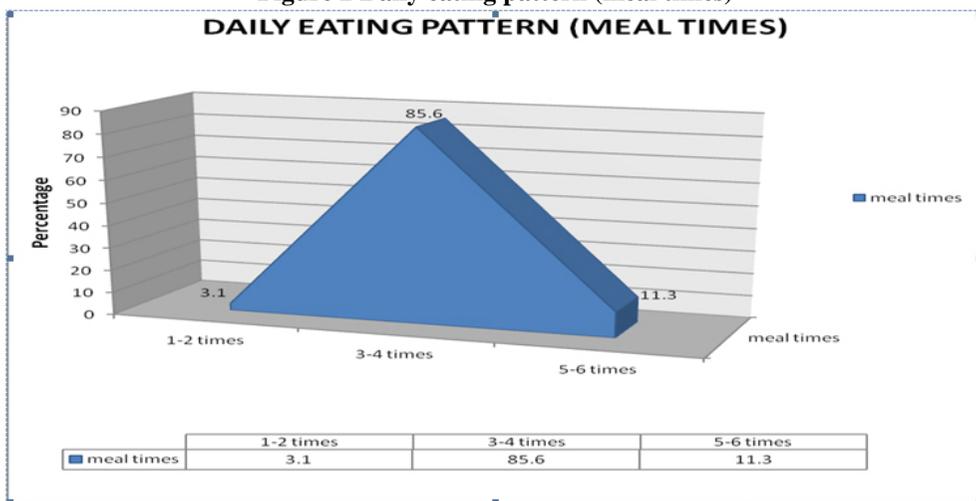
**Cross tabulation of general health by some variables of interest**

Cross tabulation of general health and experience living with diabetics indicated that it was significant that most diabetics whose health was good were not discouraged by their health condition (p value 0.007). Also their health was not a worry in their life with a p value of 0.002.

The diabetics who considered their health as good, has their health not to interfere with their household chores. (p value 0.027).

Most diabetics with their health being good were confident to control their diabetes so that it does not interfere with the things they want to do, (p value 0.004). Moreover, they were confident to follow their diet, prepare and share with non diabetics, (p value 0.035).

**Figure 2 Daily eating pattern (meal times)**



Source: research team field data, 2013

From figure 2 above, it can be seen that majority of the diabetic respondents (83) which constitute 85.6% are able to eat three (3) to four (4) times daily, 11.3% of the respondents (11) are able to eat five (5) to six (6) times in a day with 3% of the respondents (3) being able to eat one (1) to two (2) times in a day.

**Table 4: Individual Dietary Diversity Score (IDDS)**

IDDS	Frequency	Percentage
3	14	14.4
4	13	13.4
5	24	24.7
6	25	25.8
7	11	11.3
8	10	10.3
<b>Total</b>	97	100.0

*Source: research team field data, 2013*

Table 4 above depicts the individual dietary diversity score for the various diabetic respondents. 25.8% of the respondents had a dietary diversity score of 6 which happens to be the modal dietary diversity score for the diabetic respondents followed by a dietary diversity score of 5 which comprise of 24.7% of the diabetic respondents. Also 11.3% of the diabetic respondents had an IDDS of 7 and 13.4% of the diabetic respondents had an IDDS of 4. With 3 being the least individual dietary diversity score (IDDS) which constituted 14.4% of the respondents. However the highest IDDS of 8 represents 10.3% of the diabetic respondents.

The mean Individual Dietary Diversity Score (IDDS) for the ninety-seven (97) diabetic respondent stood at 5.37 with a modal IDDS being 6. The minimum IDDS of a diabetic respondent is 3 and the maximum IDDS of a diabetic respondent is 8.

**Table 5: Ranking of IDDS**

IDDS THRESHOLDS	Frequency	Percent
lowest dietary diversity ( $\leq 3$ food groups)	14	14.4
medium dietary diversity (4 and 5 food groups)	37	38.1
high dietary diversity ( $\geq 6$ food groups)	46	47.4
<b>Total</b>	97	100.0

*Source: research team field data, 2013*

From table 5, majority of the diabetic respondents to be precise 46 respondents have a High dietary diversity ( $\geq 6$  food groups), 37 of the

diabetic respondents have a Medium dietary diversity (4 and 5 food groups) and lastly the remaining 14 of the diabetic respondents have the lowest dietary diversity ( $\leq 3$  food groups). This results means that majority of the respondents consume food from at least 6 food groups which is an acceptable dietary diversity score.

IDDS by Gender indicates that females and males had mean values of 5.52 and 5.24 respectively. The female diabetic respondents averagely had a higher IDDS than their male counterparts.

**Table 6: Individual Dietary Diversity Score (IDDS) by general health Cross tabulation**

IDDS	general health					Total	p-value
	excellent	very good	good	Fair	Poor		
3	0	0	7	5	2	14	0.957
4	1	1	7	4	0	13	
5	0	1	16	6	1	24	
6	1	2	13	7	2	25	
7	0	1	7	2	1	11	
8	0	1	7	2	0	10	
<b>Total</b>	2	6	57	26	6	97	

There was no statistical significance between IDDS of diabetic respondents and their general health of the diabetic respondents ( $p$ -value = 0.957) from table 6. However, the results obtained showed that the higher the IDDS of the diabetic respondents the more they responded as their health being good comparatively.

**Table 7: Individual Dietary Diversity Score (IDDS) by occupation Cross tabulation**

IDDS		what is your occupation				Total	p-value
		not working	civil servant	businessman/woman	Other		
	3	3	1	6	4	14	0.727
	4	2	0	8	3	13	
	5	2	3	8	11	24	
	6	5	4	10	6	25	
	7	1	2	3	5	11	
	8	0	1	5	4	10	
<b>Total</b>		13	11	40	33	97	

There was no statistical significance between IDDS and occupation of the diabetic respondents ( $p$ -value = 0.727) from table 7. The results show that most respondents in the business occupation group had a dietary

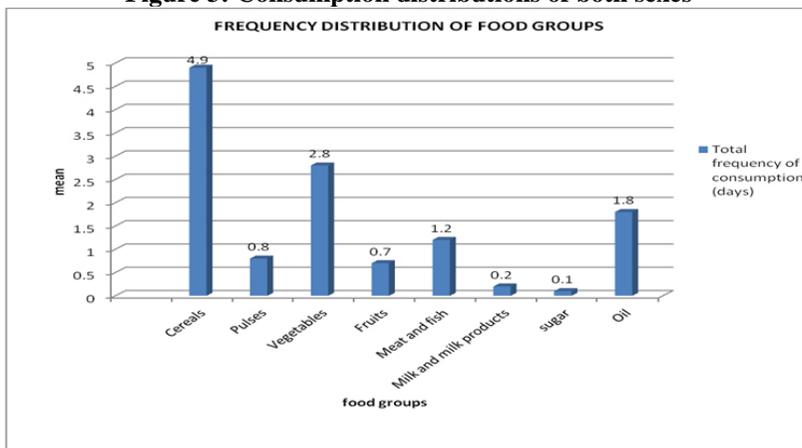
diversity score of 6 and 5 which happens to be around the mean IDDS of 5.37.

**Table 8: Individual Dietary Diversity Score by daily eating pattern Cross tabulation**

Individual Dietary Diversity Score (IDDS)	daily eating pattern			Total	P-value
	1-2 times	3-4 times	5-6 times		
3	0	14	0	14	0.036
4	1	11	1	13	
5	2	20	2	24	
6	0	24	1	25	
7	0	8	3	11	
8	0	6	4	10	
Total	3	83	11	97	

There is a statistical significance between IDDS of the diabetic respondents and daily eating pattern of respondents (p – value = 0.036) as indicated in table 8. Out of the ninety-seven (97) diabetic respondents, 70 of them had an IDDS  $\geq 6$  which means there is a positive association between IDDS and daily eating pattern thus the higher the number of meals per day the higher the IDDS.

**Figure 3: Consumption distributions of both sexes**



Source: research team field data, 2013

On the food consumption patterns of diabetics in figure 3 above, it was seen that they consumed foods from most of the food groups. Foods consumed most are those from the cereal and tuber groups and it included “tuo-zaafi” (T.Z) which is the staple food of the area, fufu, rice, bread, yam (boiled/fried) and kenkey. Pulses like beans, pea, groundnut together with vegetables especially dark green leafy vegetables were also dominant in terms of consumption. Fruits were seldomly consumed as well as milk and milk products. Meat and fish were also slightly included in their diet. Fats

and oil were moderately consumed, with the least consumption of the food group being sugar mostly honey in their diet as a dietary regime for the management of diabetes.

**Table 9: Table Food Consumption**

Food Groups	Females		Males	
	Total Frequency	Mean	Total Frequency	Mean
Cereals and tubers (staples)	216	4.9	257	4.9
Pulses	29	0.7	50	0.9
Vegetables	147	3.3	120	2.3
Fruits	30	0.7	41	0.8
Meat and fish	49	0.9	71	1.3
Milk and milk products	7	1.1	14	0.3
Sugar	2	0.04	10	0.2
Oil	86	2	89	1.7

*Source: research team field data, 2013*

Per table 9 above, the food group most frequently consumed is cereal with a total frequency of consumption for males being 257 for 53 and 216 for 44 diabetic female respondents. This could be attributed to the fact that cereals are the most available food crops grown within their geographical location and the mainstay of the diet of the people. These cereals include maize, rice, millet, sorghum, amongst others. The food group least consumed is sugar usually in the form of honey.

### **Food Consumption Score for the Diabetic Respondents**

The mean food consumption scores for the males and females stood at 22.95 and 22.12 respectively.

**Table 10: Food Consumption Score Thresholds**

<b>FCS THRESHOLDS</b>	<b>PROFILES</b>
0 – 21	Poor food consumption
21.5 – 35	Borderline food consumption
>35	Acceptable food consumption

*Source: WFP/FAO, 2008*

Comparing the mean FCS of the diabetic respondents to the FCS thresholds in table 10 it can be deduced that both the male and female diabetic respondent with mean FCS of 22.95 and 22.12 respectively falls within the borderline food consumption category.

**Sugar consumption:** The consumption of sugar as compared to the other food groups was 0.9% which happens to be the least among other food groups consumed. Majority of the diabetic respondents (93.8%) perceive sugar to be detrimental to their health and therefore restrict sugar intake, the remaining (6.2%) take sugar mostly in the form of honey.

**Figure 4: Psychological impact of Living with diabetes**

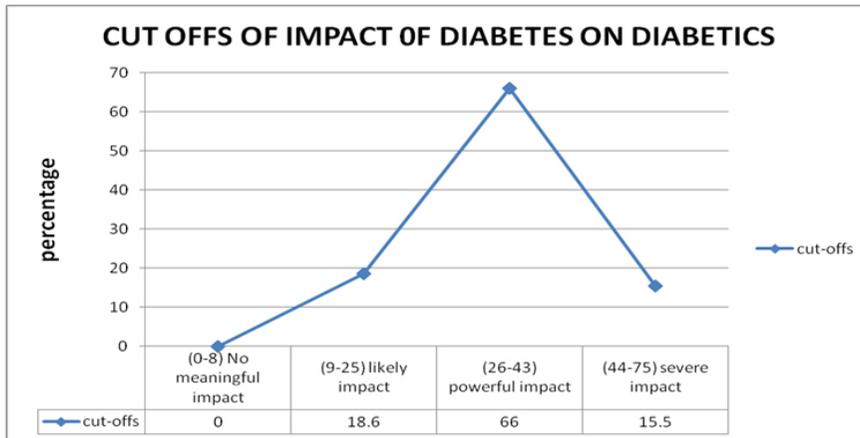


Figure 4 indicates that all the respondents have the risk of PTSD as a result of living with diabetes. 18.6% of them have a likely impact of PTSD as a result of living with diabetes, 66% of them have a powerful impact while 15.5% of them have a severe impact.

## Discussion

### Socio demographic characteristics

**Gender of diabetic respondents:** From the study the age group of the diabetic respondents showed a fair representation of males (54.6%) and females (45.4%). This fair representation can be attributed to the proportions of males and females in the Tamale metropolis as the males constitute the majority of the population with 51.1%. The slightly higher male diabetic respondents could be due to the fact that men seem more susceptible than women to the consequences of indolence and obesity (Gale and Gillespie 2001) which is a risk factor for type 2 diabetes.

**Age group of diabetic respondents:** It could be seen from the study that cumulatively, 80.4% of the total respondents (about eight out of every ten respondents) were aged 40 years and above. This group may be considered as the most prevalent age group of type 2 diabetes in the Tamale Teaching hospital. However a study by (sierra, 2009) reviewed that until recently, this type of diabetes was seen only in adults but it is now also occurring in obese children.

**Occupation of diabetic respondents:** From the study, 13.4% of the diabetic respondents were unemployed. This percentage of unemployment is slightly higher than the national unemployment rate which is 11% (CIA World factbook, 2013), thus despite living with diabetes, majority of the diabetic respondents are able to work for a living.

**Dietary Assessment:** Dietary patterns represent the most adequate approach to assess the role of diet on the risk of diabetes. The assessment of whole dietary patterns has become instrumental in nutritional epidemiology. The rationale for this concept is that synergistic or antagonistic effects may exist between the different components of a food pattern (Jacobs et al, 2009)

Lack of dietary diversity is particularly a considerable problem among individuals in the developing world as their diets are predominantly based on starchy staples (Ruel, 2003). The below would thus look at food consumption among diabetics and the relations to their demographic characteristics.

**Food consumption pattern:** In our research the food consumption patterns of diabetic respondents was seen as consuming foods from most of the food groups. Foods mostly consumed by the diabetics were from the cereal and tuber groups and it includes “tuo-zaafi” (T.Z) which is the staple food of the study area, fufu, rice, bread, yam (boiled/fried) and kenkey. Pulses like beans, pea, and groundnut together with vegetables especially dark green leafy vegetables were also dominant in terms of consumption. Our finding is in consonance Elwood et al (2008) studies where their respondents seldomly consumed fruits as well as milk and milk products even though a lower risk of diabetes was associated with high milk intake.

Meat and fish were also slightly included in their diet. Fats and oil were moderately consumed, with the least consumption of the food group being sugar mostly honey. It was also found that eggs were sparingly consumed. This may be said to be good since high levels of daily egg consumption may be deleterious for diabetes risk as pointed out by Hu et al (1999).

**Individual dietary diversity score (IDDS):** The mean individual dietary diversity score of 5.37 was not up to the highest dietary diversity of  $\geq 6$  food groups thus it reflects that diabetics’ dietary diversity was not up to the optimum level. This lower mean value could also indicate that majority of the diabetics consume undiversified diets.

The lower mean of the dietary diversity score was attributed to low scores in food groups providing iron such as organ meat and animal source of protein such as flesh meat, eggs and fish. The higher IDDS for most individuals are attributed to the cereals, vegetables and, oils and fat food groups.

Almost all of the diabetic respondents from our research in view of preventing overweight and obesity make conscious effort to engage in physical exercise as proposed by Anthony *et al* (1999) and Salas-Salvado´ et al. (2010).

**Cross tabulation of IDDS by general health:** There was no statistical significance between IDDS of diabetic respondents and their

general health of the diabetic respondents (p-value = 0.957). However, the results obtained showed that the higher the IDDS of the diabetic respondents, it is more likely they would respond as their health being good. This finding agrees with the conventional wisdom embodied in dietary guidelines concerning the benefits of a varied diet (Tucker 2001).

**Cross tabulation of IDDS by occupation:** There was no statistical significance between IDDS and occupation of the diabetic respondents (p-value = 0.727). The results show that most respondents in the business occupation group had a dietary diversity score of 6 and 5 which happened to be around the mean IDDS of 5.37. The kind of occupation one is engaged in may influence the dietary diversity. This is in tune with the work of Tefera B et al (2007) that gender, income, educational status and occupation were associated with low quality diet consumption.

**Cross tabulation of IDDS by daily eating pattern:** There is a statistical significance in the relationship between the IDDS of the diabetics and daily eating pattern (p – value = 0.036). Out of the ninety-seven (97) diabetic respondents, 70 of them had an IDDS  $\geq 6$  which means there is a positive association between IDDS and daily eating pattern thus the higher the number of times of eating in a day the higher the IDDS. Majority of the diabetic respondents ate three or more times in a day. This pattern of consumption follows the WHO recommendation of three meals a day.

### **Diabetic Food Consumption**

Cereals were consumed the most among both sexes. This could be attributed to the fact that cereals are the most available food crops grown within the geographical location and the mainstay of the diet of the people. These cereals include maize, rice, millet, sorghum, amongst others. The least food group consumed was sugar. Foods in the sugar group such as honey were consumed in smaller quantities and do not form a major part of the diet of the diabetics, this could be said to be in conformity with the American Diabetes Association's guideline of moderate amount of sugar consumption (Franz et al., 2002).

From the study, comparing the mean FCS of the diabetic respondents to the recommended FCS thresholds, both male and female diabetic respondents had mean FCS of 22.95 and 22.12 respectively which falls within the borderline food consumption category. The mean FCS of both sexes being classified as borderline food consumption means that the diabetics at the Tamale Teaching Hospital in general have a reduced food intake which could be due to their condition in a bid to maintain ideal body weight. Even though there are no specific thresholds for diabetics, the thresholds presented by WFP/FAO (2008) were used to classify the mean FCS.

**Prohibited foods for a diabetic as perceived by diabetic respondents:** Majority of the diabetic respondents (93.8%) perceive sugar to be detrimental to their health and therefore restrict sugar intake, the remaining (6.2%) take sugar mostly honey. This finding is in consonance with the American Diabetes Association recommendation of limiting intake of sugar-sweetened beverages to help prevent diabetes.

**Psychological impact of Living with diabetes:** Figure 7 under results indicates that all the respondents have the risk of PTSD as a result of living with diabetes. This may indicate that all the diabetic respondents have a psychological problem in one way or the other in relation to their condition (living with diabetes). This might influence their food intake and their general well being. 18.6% of them having a likely impact of PTDS as a result of living with diabetes, 66% of them have a powerful impact while 15.5% of them have a severe impact is a powerful indicator that majority of the diabetic respondents are not just worried of their condition but that they dread it. This thus suggest that they need additional help and support from their care givers.

## **Conclusion**

This study sought to assess the role of diabetes in food intake among diabetics at the Tamale Teaching Hospital. Regarding food consumption patterns, diabetic respondents were consuming foods from most of the food groups. Foods consumed frequently were those from the cereal and tuber groups, vegetables especially dark green leafy vegetables were also dominant in terms of consumption. Fruits were however seldomly consumed. The study found out that diabetes does have an influence on food intake among diabetics. It was however noted that a healthy meal plan for the diabetic respondents was generally the same as a healthy diet for anyone – low in fat meals, based on whole grain foods, vegetables and fruit. The outstanding difference in the food intake of the diabetics are their no or limited intake of sugar which sometimes are substituted with honey.

The mean individual dietary diversity score of 5.37 was below optimum dietary diversity score of  $\geq 6$  food groups. This indicates that the dietary diversity of the diabetics is below the desired level. The lower mean dietary diversity score is attributed to low scores in food groups providing iron such as organ meat and animal source of protein such as flesh meat, eggs and fish. The higher values for most individuals were attributed to the cereals, vegetables and, oils and fat food groups.

The consumption of sugar and sugar products as compared to the other food groups was insignificant as it happens to be the least among other food groups consumed. About 15 out of every 16 diabetic respondents (93.8%) perceive sugar to be detrimental to their health and therefore restrict

sugar intake, the remaining (6.2%) conscientiously take sugar mostly honey. It was also found out that Male and Female diabetic respondents had mean FCS of 22.95 and 22.12 respectively which falls within the borderline food consumption category which confirms the unvaried nature of the diet of diabetics as indicated above.

On the psychological impact of living with diabetes among diabetics in Tamale Teaching Hospital, it was found out that all the diabetics had the risk of post traumatic stress disorder (PTSD); about four out of every six diabetics had 75% chance of being diagnosed with post traumatic stress disorder while one (1) out of every six (6) diabetics had the greatest chance (above 75%) of being diagnosed with PTSD.

### **Recommendations**

Based on the findings of this study, it is recommended that:

- Routine psychological services be offered at the diabetic clinic of the Tamale Teaching Hospital during its sessions and if possible attach a clinical psychologist permanently to the clinic to enable easy access by clients.
- Regular nutrition education should be offered to clients and reference materials on diet and diabetes provided to those who can read.
- Further studies should be conducted on food intake of diabetics with particular emphasis on serving size of meals consumed by diabetics.

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