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# The Effect of Food Nutrition Perception on Households' Dietary Diversity Score: The Case of Mazimbu Village, Morogoro, Tanzania

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**Abstract:- The study investigated households' food nutrition perception at Mazimbu village in Morogoro municipality and the role of food nutrition perception on a household food diversity score. A household food diversity score could be an indicator of many nutrition aspects notably food accessibility and availability. Most previous studies assessing household food diversity especially in Tanzania have not considered the fact that a household may have a poor food diversity score not because of inaccessibility or unavailability but because of wrong food nutrition perception. The study involved 385 households targeting a married or single woman in a household. Households were selected randomly from a list of households provided by the village chairman of Mazimbu Village. Data from the households were collected using questionnaires which contained questions on households' demographic characteristics, food nutrition perception and food diversity score. Data were summarized and coded using SPSS where perception scores were analyzed using 5-point Likert scale while influence of households' food nutrition perception on food diversity score was analyzed using a binary logistic regression. Results indicate that women at Mazimbu village have positive food nutrition perception and that majority of them do consume at least three food groups. As regards the influence of a household food nutrition perception on a household food diversity score, results indicate that a household's positive food nutrition perception do also positively affect a household food diversity score and the vice versa. The study recommends to the government and other stakeholders, that in order to improve food diversity at household level, nutrition education campaigns among women and daughters should be highly encouraged along with efforts to improve households' income levels.**

***Keywords:-*** *Food Diversity Score, Food Nutrition Perception, Demographic Characteristics.*

## I. INTRODUCTION

Dietary diversity is defined as the number of different foods or food groups consumed over a given reference period (Johns & Sthapit, 2004). Dietary diversity refers to the increase in the variety of foods across and within food groups (WHO/FAO , 1996). Dietary diversity is associated with household or individual food availability and intake of nutrients from different food groups and is an important component of nutritional outcome (Nithya and Bhavani 2018). Dietary diversity is positively linked with three pillars of food security (Egan & Hillbruner, 2008). The three pillars refer to three important aspects of food security which are availability, access and utilization (Msuya, 2016)

Synonymous with dietary diversity is the concept of dietary quality which varies widely, but historically, it has been used to refer to nutrient adequacy (Hussey, 2010). Nutrient adequacy, in turn, refers to a diet that meets requirements for energy and all essential nutrients (Torheim et al, 2004). The growing concern in developed countries as well as in countries that are in transition is over nutrition and excess intake of certain nutrients and foods, this concern has led to a global shift in the definition of dietary quality to include both concepts of nutrient deficiency and over nutrition (Sawadogo et al., 2006). Nutrient adequacy refers to the achievement of recommended intakes of energy and other essential nutrients.

Across the global there is a variation in food intakes between rural and urban dwellers and equally well between people in developing countries and people in developed countries. In Africa, food security is a problem caused by climatic changes and historical background of African countries in the level of economic development (Hillbruner & Egan, 2008, 2006). Food insecurity contributes higher to poor nutrition diversity especially to sub-Saharan countries. In sub-Sahara African countries, diets are predominant based on starchy foods with little or no animal products and few fresh fruits and vegetables (Lumole, 2013)

In Tanzania, cereals (grains) contribute more than half (51%) to the total dietary energy supply, followed by starchy root-tubers (19%) (Kinabo, et al., 2006). Therefore, the nutrition diversity, i.e. the contribution of other food groups than cereals and starchy- roots is too minimal. Unfortunately, while this is the fact in Tanzania, studies have shown that the overall nutrition quality improve with increase in number of food groups, the more food groups are the quality and better nutrition is.

Proper nutrition is important to human dietary intake as it influence human wellbeing. Many studies have attempted to establish why there is poor nutrition diversity for most households. Taruvinga, Muchenje, & Mushunje (2013) conducted the study on household dietary diversity to community in Eastern Cape Province of south Africa with a sample of 181 households, the study points out the determinants of household nutrition diversity as, gender, education, income, access to hove garden, and ownership of small livestock.

Mbwana et al.(2016) argues that nnutrition diversity is not only influenced by food security (availability, accessibility, and timing) but also by factors such as income, area under cultivation, number of people in the household, and food source which can lead to single food group consumption (monotonous food consumption). According to Mbwana et al (2016), these factors can farther be affected by individual factors such as age, gender, education level of household head, and ethnicity.

Many studies suggest a strong association between income and dietary diversity (Ruel, 2003). This view is also supported by Tanzania nation nutrition survey (2014) which argued that the nutrition status in Tanzania was and still is influenced by the level of economic development. According to the survey report, Tanzania is among the poor countries whose households' income is too low to obtain required food groups to meet the diet requirement of the households' members. Similarly, Thiele & Weiss (2003) in Germany noted that household incomes varies directly with household food diversity score. Other factors found in the study to be influencing household food diversity score were being married, being young. Being highly educated, being not a farmer and not being full time worker.

From the given review of literature, it is quite clear that major determinants of food diversity include social demographic characteristics such as age, sex, employment status, education level and ethnicity. At the same time, it can be observed that these studies have not addressed an issue of food perception by a household as one among key determinants of food diversity. This study aims to fill this gap by addressing the role of a household food nutrition perception on food diversity after controlling for other factors, especially demographic characteristics.

Specifically, this study aims to address the following:

- To establish food nutrition perception of inhabitants of Mazimbu village
- To examine the influence of households' food nutrition perception on food diversity score of households at Mazimbu Village after controlling for households' social demographic characteristics

## II. METHODOLOGY

### *A. Research Design, Study Area, Sample Size, Sampling Method and Data collection*

The study was conducted at Mazimbu village, which is situated in Morogoro municipal just few kilometers from the Centre of the Morogoro municipal. Mazimbu village/street is in north Morogoro municipal, few kilometers Westside along Dodoma road. The study target population consisted of all women adults who are either married or single. Therefore, a sampling unit was a household while the study unit was either a married woman or a single woman found in a household. The study sample consisted of 385 households which was reached based on the sample size formula by Yamane (1967) of sampling from a finite population. Households were selected using a simple random sampling based on the list prepared by the village chairman. Data from the households were collected using questionnaires. The questionnaires consisted of questions asking the respondents their demographic characteristics such as age, sex, education and marital status, as well as questions asking their food nutrition perception and food intakes over the past 24 hours.

### *B. Measurement of Food Nutrtion Perception*

In order to estimate household's perception on food nutrition, ten statements were constructed to explaining different aspects of food nutrition. Some of these statements were true and some were not true. The respondents were just required to indicate their position on each of those statements by choosing one of the options among, strongly agree, agree, neutral, disagree and strongly disagree. Later on, the households scores from all the statements were summarized into 3 answers, agree, neutral and disagree. Then percentages of total households who agree, who are neutral and who disagree were summarized per each statement and for overall statements.

But also, for each individual households the perception score was computed by averaging her score from all the 10 statements and if the households score was above 3, a household was regarded as having positive perception towards food nutrition, otherwise if the household score was below 3 or just 3, was regarded as having negative perception on food nutrition perception. This categorization led the study to create a binary indicator of positive perception (1) and of negative perception (0) to be used as a factor in the regression of food diversity score against food nutrition perception.

*C. Measurement of Food diversity*

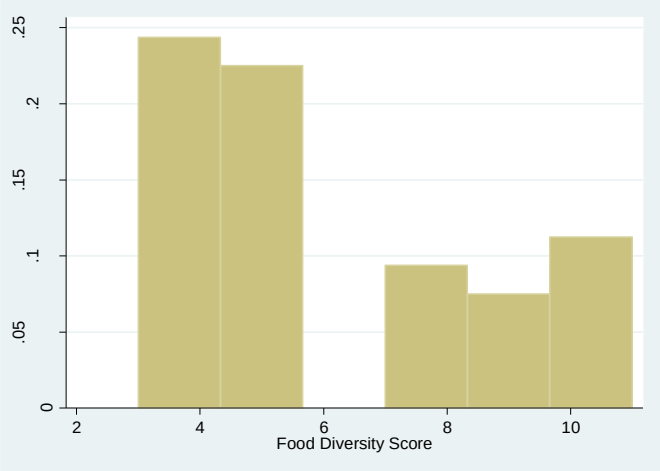
Nutrition diversity is usually measured by summing the number of foods often by counting number of food groups consumed over a reference period (Vakili et al., 2013 and Ruel, 2003). At household, level, Vakili, et al (2013) and Ruel (2003) suggested that dietary diversity can be used as a proxy measure of food access while at individual level like a reflection of nutrition quality. Many studies in Africa used food group counts to measure food diversity score. For example, in Ethiopia, Arimond and Ruel (2002) used food group counts while in Nigeria, Tarin et al.( 1999) also used food group counts .This study also used food group counts to measre a household food diversity score.

Dietary diversity score is calculated by summing the number of food groups consumed in household or by the individual respondent within the last 24-hours (FAO, 2011). The number of food groups used in calculating nutrition diversity score at individual level suggested to be nine (9) food groups, different from the way nutrition diversity score calculated at household level where only twelve number of food groups taken into consideration (Swindale, 2006). There is no international consensus on the number of food groups to be included in the calculation of food diversity score, except for calculation of nutrition diversity score of children aged 6-23 months (WHO, 2010). This study used sixteen food groups in calculating nutrition diversity score as per guidelines from (FAO, 2011). The sixteen food gropus include cereals such as ugali, white roots and tubers such as white potatoe, Vitamin A rich vegetables and tubers such a carrot, dark green leafy vegetables such as cassava leaves, other vegetables such as tomatoes and onions, Vitamin A rich fruits such as mangoes, other fruit such wild fruits, organ meat such as liver or heart, Flesh meets such as beef, goat and chicken, eggs, fish and seafood, legumes nuts and seeds, milk and milk products, oil and fats, sweets such as sugar and honey and lat spices, condiments, beverage

*D. The Influence of Households' Food Perception and Demographic Characteristics on Food Diversity*

The influence of households perception and households' demographic characteristics were assessed using a binary logistic regression. The household food diversity scores were classified into two groups (less than 5 and above 5). This classification followed the fact that a histogram of the households' food diversity scores depicted a bimodal distribution of the food diversity scores suggesting that they had a binary response distribution. Some of food diversity scores concentrated around 5 and the rest around 9. Figure 1 next indicates the histogram of the household food diversity scores.

The Histogram of Food Diversity Scores of Households at Mazimbu Village




Following this classification, a household with a food diversity score which is less or equal to 5 was assigned a score of "0" where as a household with a food diversity which is greater than 5 was assigned a score of "1". Therefore, a binary logistic regression was used to assess the influence of food perception and demographic characteristics on food diversity score.

The estimation model was stated as follows:

$$\log\left[\frac{p}{1-p}\right] = \beta_o + \beta_1 age + \beta_2 ms + \beta_3 fsize + \beta_4 edu + \beta_5 Employment + \beta_6 Dist + \beta_7 Expenditure + \beta_8 perception + \varepsilon_i$$

Where $\beta_o$ is a constant

- ✓ Age is the age of a woman in household
- ✓ Ms is 1 if a woman is married and is 0 if otherwise
- ✓ Fsize is the number of people in the households
- ✓ Edu is the education level of the household measured in years of schooling
- ✓ Employment is 1 if a woman is not a mere farmer and is 0 if a woman is a farmer
- ✓ Dist. is the distance (km) from home to the Market and is "0" if a household resides at Modeco which is near the market and is "1" if a household resides at dark City which is far from the market.
- ✓ Expenditure is the household dally expenditure measured in Tanzanian shillings
- ✓ Perception is 1 if a household perception is positive and is 0 if otherwise

*E. The Expected Sign of the Independent Variables*

Following the discussions in section 1, the study proposed the signs of the expected variables as given in Table 1.

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| Variable | Acronym | signs |
|---|---|---|
| Age | age | + |
| Marital Status | ms | + |
| Family size | Fsize | - |
| Education | Edu | + |
| Employment | Employment | + |
| Distance | Dist | - |
| expenditure | Expenditure | + |
| Perception | Perception | + |

Table 1:- The expected signs of the independent variables

## III. RESULTS AND DISCUSSION

### *A. Demographic Characteristic of the Respondents*

Table 2 indicates the demographic characteristics of the respondents.

| | | |
|---|---|---|
| **Age** | | |
| | Frequency | Percentages |
| Above 30 years | 184 | 48 |
| Less than 30 years | 201 | 52 |
| **Marital status** | | |
| | Frequency | percentage |
| Married | 231 | 60 |
| Single | 154 | 40 |
| **Family size** | | |
| | Frequency | |
| ≤ 3 | | 58 |
| >3 | | 42 |
| **Occupation** | | |
| | Frequency | |
| Employed | 77 | 20 |
| Unemployed | 308 | 80 |
| **Education** | | |
| | Frequency | |
| Primary | | |
| Above primary | 154 | 40 |
| | 154 | 40 |
| | 77 | 20 |
| **Distance** | | |
| Near the market(<2km) | 231 | 60 |
| Far from the market(>2km) | 154 | 40 |
| **Average Expenditure** | | |
| | Frequency | |
| Less than 4000 | 270 | 70 |
| Above 4000 | 115 | 30 |
| **Food nutrition perception** | | |
| | Frequency | |
| Positive | 300 | 78 |
| Negative or neutral | 85 | 22 |

Table 2:- Demographic Characteristics of the Respondents

Results from Table 2 indicate that households' ages were equally balanced between households with age less than 30 and those with age above 30. The married women were more in number (60%) compared to unmarried women. The study had a fair composition of women who could reflect the effect of married and unmarried women on food diversity score. In terms of family size, there were more women who have small family (52%) size than those with big family size. Family size could imply anything with regards to food diversity score. In terms of occupation, a good number of the women were not formally employed rather housewives (80%). As regards education level, there was a balance between primary school leavers and secondary school graduates who in total made 80% of the entire study sample, while 20% was made of women with post-secondary school education. Regarding distance from home to the market a good number of women were leaving close to the market (60%) and only few were far away from the market (40%). In terms of incomes majority had lower incomes (78%) while a few of them had high incomes. On food perception, majority of them had a positive food nutrition perception and few had negative or neutral food nutrition perception**.**

### *B. Households' Perception on Food Nutrition*

Table 3 below summarize the households' response on ten statements regarding nutrition perception. Notice that A means Agree, N means neutral and DA means disagree.

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| | STATEMENT | A % | N % | DA % |
|---|---|---|---|---|
| **1** | Do you agree that eating vegetables in most of the time will lead to a good nutrition status? | 90 | 7 | 3 |
| **2** | Eating more starch food group, it make the body more energetic and strong. | 87 | 6 | 7 |
| **3** | Eating fruits of variety types in most of the time lead to a good nutrition status. | 83 | 17 | 0 |
| **4** | Do you agree that eating a multiple food groups than single food group for a long time is healthier than? | 87 | 5 | 8 |
| **5** | Do you agree that changing food composition in food staff is healthier than eating similar food group all the time? | 90 | 5 | 5 |
| **6** | Do you agree that eating meat for the most of time will lead you to a good nutrition status? | 32 | 3 | 65 |
| **7** | Do you agree that eating more lipids food group and alcohol in most of the time will lead to good nutrition status | 8 | 22 | 70 |
| 8 | Eating more processed food, leads to good nutrition status than natural food staffs | 10 | 17 | 73 |
| 9 | Eating natural food with high sugar contents like fruits, carbohydrates always lead to poor nutrition status (diabetes) | 20 | 23 | 57 |
| 10 | Do you agree that eating food which lack vegetables and fruits in most of the time has no any nutritional health problems? | 10 | 15 | 75 |

Table 3:- Households' Food Nutrition Perception

The results indicate that overall most of the households have positive perception with regards to food nutrition. Most of them (90%) recognize the importance of vegetables in providing good nutrition to the body. They also recognize the role of starch in providing energy to the body (87%) and the role of fruits in protecting the body (83%) and that food diversity could be obtained by eating multiple food groups/changing food composition (87% -90%). The households understand also that eating meat for the most of the time would not lead to good nutrition status (65%). The households also recognize that alcohol and too much processed food would not lead to better health (70 & 73%). Finally, a good number of households understand that eating fruits and natural foods could be a remedy to some of the common diseases such as diabetes and blood pressure. Overall 78 % of the households were positive with regards to food nutrition perception, and only 22 % were either negative or neutral with food nutrition perception.

*C. Households' Food Diversity at Mazimbu Village*

According to Food and Agriculture Organization (FAO) dietary diversity score (DDS) can be categorized into three divisions such as, consumption of less than 3 food groups classified as low dietary diversity, 4-5 food groups is classified as Medium dietary diversity and greater or equal to 6 food groups classified as high dietary diversity. The results showed that (60%) of all households at Mazimbu village had dietary diversity score of greater than 6 food groups meaning that there was higher food diversity, 25% had dietary diversity score ranging in 4-5 food groups meaning moderate food diversity and the rest 15% had less than 3 food groups meaning poor/low food diversity (Table 4). In addition, the mean dietary diversity score (DDS) at Mazimbu village was (5.32± 2.63) meaning that in any household there was food consumption of at least three food groups and at most 8 food groups.

| DDS | | Frequency | Percent |
|---|---|---|---|
| ≤ 3 Food groups, | Low/poor | 58 | 15.0 |
| 4-5 Food groups, | Moderate | 96 | 25.0 |
| ≥ 6 Food groups, | Higher | 231 | 60.0 |
| Total | | 385 | 100.0 |

Table 4:- Food Diversity Score

*D. Influence of Households' Food Perception and Demographic Characteristics on Food Diversity Score*

| Variables in the Equation | B | S.E. | Wald | Df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|
| **Age** | **3.041** | **1.207** | **6.345** | **1** | **.012** | **20.920** |
| **Marital status** | **3.112** | **1.518** | **4.204** | **1** | **.040** | **22.477** |
| Family size | .119 | .391 | .093 | 1 | .761 | 1.127 |
| Education years | .194 | .198 | .964 | 1 | .326 | 1.214 |
| Employment/occupation | .224 | 1.246 | .032 | 1 | .857 | 1.251 |
| **Distance** | **-1.375** | **.812** | **2.864** | **1** | **.091** | **.253** |
| Average expenditure | 2.125 | 1.05 | 4.096 | 1 | .023 | 8.373 |
| **Perception score** | **2.052** | **.955** | **4.615** | **1** | **.032** | **7.781** |
| Constant | -8.164 | 5.880 | 1.928 | 1 | .165 | .000 |

Table 5:- Binary logistic Regression of Food Diversity Score on Households' Food Nutrion Perception and Demographic Characteristics (Cox &Snell R square =0.296, Nageikerke R square=0.404, P=0.000)

Results from Table 5 shows that households' perception on food nutrition is significant (p=0.032) with positive influence. As described before household perception was coded as "0" for a household with negative perception and "1" for a household with positive perception. Therefore, these results imply that a household with positive food nutrition perception is likely to have a high food diversity score unlike a household with a negative food nutrition perception. These results highlight the fact that a household food nutrition perception has a great role to play in influencing household food nutrition status. The variable was significant before including the demographic characteristics and after controlling for the demographic characteristics.

Results from Table 5 indicates that age of the respondent is significant (p=0.012) with positive influence (3.041) implying that households with older women have higher food diversity score as compared to household with young women. This could be, due to the fact that aged women have vast experience in food choices and cooking. This result is also confirmed by Taruvinga et al (2013) who also argued that as time goes on married women improves household nutrion as opposed to those who are yet married as a result of food choices and experience. In addition, nutrition diversity score is affected by individual factors such as age, gender, education level of household head, and ethnicity (Mbwana et al., 2016). The Wald value for age was the highest among all implying that the age of a respondent was the most influential variable among the demographic characteristics.

Marital status was also found to be significant (p=0.04) and appearing with positive coefficient The variable was coded as "0" for single and "1" for married implying that married households have higher food diversity score. This could be due to the fact that married women have more time to prepare food and to seek for various food staff than single ones. (Hudu & Dujin , 2014) found age, marital status, and household membership structure, participation in household decision-making, ethnicity and literacy as significant socioeconomic determinants of dietary diversity among mothers in Northern Ghana. Married people tend to consume a greater variety of food, perhaps because responsibility for other family members leads to a wider variety of dietary items in the household (Liu et al., 2014)

Distance from home to the market has been slightly significance (p=0.091) with negative coefficient i.e. -1.373. The variable was coded as "1" for households who are closer to Mazimbu market and "2" for those who are far away from the market. Residents who are close to the market are ones living around Modeco and Dark city areas while those who are far away are the ones. Living in areas such as Manyuki and near Lukobe. The implication of these results is as you move away from Modeco or Dark city towards Lukobe nutrition diversity score decreases. This could probably be due to the fact that Modeco is closer to food market where variety of food groups can be found as opposed to Dark city.

As expected, household income as measured by family expenditure was significant with positive influence on household food diversity score. This result highlight what has been argued before by author such as Ruel (2003) regarding the importance of household income on food diversity.

## IV. CONCLUSION AND RECOMMENDATION

The study investigated the role of household food nutrition perception on households' food diversity scores after controlling for household demographic characteristics. Questionnaires were used to collect data from 385 households who were obtained through a simple random sampling using a register book obtained from the village chairman. Data were analyzed using a binary logistic regression. Results indicated that household food nutrition perception significantly affect a household food diversity score. Other factors which also affects a household food diversity score includes age, marital status, distance from home to the market, and daily expenditure.

The study recommends to the government and other stakeholders, that in order to improve food diversity at household levels, nutrition education campaigns among women and daughters should be highly encouraged along with efforts to improve households' income levels.

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