African Journal of Agricultural Research Vol. 6(11), pp. 2617-2626, 4 June, 2011
Available online at http://www.academicjournals.org/AJAR
DOI: 10.5897/AJAR10.891
ISSN 1991-637X ©2011 Academic Journals

Full Length Research Paper

The dietary importance of maize in Katumba ward, Rungwe district, Tanzania, and its contribution to household food security

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Accepted 31 January, 2011

Maize is one of the main staple food crops in Katumba ward. The dietary importance of maize in Katumba ward was investigated through studying the importance of maize as a source of food, nutrients and energy in using secondary data and face to face structured and semi- structured interviews that were administered using a questionnaire to 260 farm households that were randomly selected for the study. The aim of the study was to provide empirical data that show how maize contributes to household food security in Katumba ward. In turn, the data can be used to advocate for agricultural policy that promotes maize quality through using efficient storage methods in the ward and other places that have the same climatic conditions as Katumba ward. It was found that farm households in Katumba ward prefer maize meals, and that they may be able to obtain 66.8 to 69.5% of the total energy and 83 to 90% of the total protein required per day through maize meals consumption. Therefore it was concluded that maize is a very important food crop in Katumba ward, and it was recommended that storage mechanisms in this ward be given adequate attention in order to maximize the quality of stored maize for the enhancement of healthy diets and food security of the consumers.

Key words: Maize, food security, Katumba ward.

INTRODUCTION

Maize is an important food crop not only because it is consumed worldwide, but also due to its nutritive value. Maize provides more carbohydrates than wheat and sorgham do, and it is a good source of phosphorus (Adeyemo, 1984; Brandes, 1992) and it also contains small amounts of calcium, iron, thiamine, niacin and fat (Adeyemo, 1984). Furthermore, maize tends to provide high yield per unit of land (Brandes, 1992), which makes maize a key crop in ensuring availability of food and promoting food security of the consumers. By definition, "food security is a state reached when all people at all times have access to adequate amounts of safe and nutritious food to meet their dietary needs and food preferances for an active and healthy life" (FAO, 2008). In line with its definition, food security has a lot to deal with the availability of preferred food, the nutritional value of the available food, and well being of the consumers.

Also, reports show that maize is an important staple food crop in Africa (Adeyemo, 1984; Bryceson, 2009; Olakojo et al., 2005), and that it is the major food crop in Tanzania (Katinila et al., 1998; Amani, 2004), While over 80% of the population of Tanzania depends on maize for food (Bisanda and Mwangi, 1996), maize production in Tanzania varies with time. In 1990 to 1991, with 2,635,000 tons of maize were produced in Tanzania, the amount of maize produced dropped to 2,551,000 tons in 2000, and the amount increased to 2,698,000 and 2,700,000 tons in 2001 and 2002, respectively (FAO Bulletin of Statistics, 2004). In 2006 to 2007, an estimate of 2,638,000 tons of maize were produced in Tanzania, and in 2009 to 2010, the amount of maize that was produced dropped to 2,107,000 tons (Unesco National Commission of the United Republic of Tanzania, 2010).

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It is also estimated that the annual per capita consumption of maize in Tanzania is 112.5 kg, which contributes to 60% of the total energy in the diets of Tanzanians, and amounts to 3,000,000 tons of maize consumed annually (Katinila et al., 1998) in this country. In Tanzania, maize is also used for brewing beer, as animal feed and as a cash crop (Green, 1999; Katinila et al., 1998). In Rungwe district, maize is highly valued (National Bureau of Statistics (NBS) Mbeya Regional Commissioner's Office, 2003), it grows well and it is well adapted to the climate of Rungwe district. However, maize production in Rungwe district has not been studied before. Its dietary importance and ways in which it contributes to household food security in this district had also not been studied before, hence this study. Establishment of the dietary importance of maize in Katumba ward was significant as it provided empirical data that highlights ways in which maize contributes to household's food security in Katumba ward, which can also be used for advocating for agricultural policy that can promote production and safety of maize in Rungwe district and other places.

Main objective

Themainobjective of this study is to investigate the dietary importance of maize and its contribution to household food security in Katumba ward, Rungwe district, Tanzania.

Specific objectives

1. To study the importance of maize as a source of food in Katumba ward.
2. To investigate the nutritional importance of maize in Katumba ward.
3. To investigate the importance of maize as a source of energy in Katumba ward.
4. To investigate the importance of maize as a source of protein in Katumba ward.

MATERIALS AND METHODS

Sampling

In order to give each household an equal chance of being selected, 260 out of the total of 2639[1] small scale farm households in Katumba ward were sampled for the study through systematic random sampling. Sample size for this study was determined with the aid of a sample size calculator, a computer program commonly used for easy and fast calculaton of sample size (Dattalo, 2008). The calculation was done at 95% confidence level, 6% precision and 100% response rate. The procedure for systematic random sampling as explained by Trochim (2001) was applied. The total number of households in Rungwe district was divided by the required number of sample households to get the interval at which a sample household should be selected. In this case, 2639 devided by 260 equals 10.15. Rounding the figure 10.15 to 10, a sample household was chosen by walking through the population and selecting every tenth household from the starting point which was randomly selected.

Data collection

Apart from the secondary data that was used for the study, semi-structured and structured face to face interviews were administered to the 260 sample households in order to make possible the participation of participants who cannot read or write in line with Trochim's (2001) recommendation. The interviews were conducted in Swahili, the official language in Tanzania, at the participants own homes or venues of their choice in order to make easier the participation of women. In Rungwe district most of the farming activities including processing and crop storage are done by women (Food and Agriculture Organisation of the United Nations (FAO), 1994). Thus particpation of women in this study was considered crucially important. Data that was collected include the type of maize that the farm households in Katumba ward grew, type of maize meals that the farm households often used and the number of days per week during which each farm household consumed maize meals.

Information regarding the number of maize meals that a household consumes daily and the total number of meals that each of the farm households consumed per day was also collected. Data collected also included the quantities of maize flour that the farm households used per meal, reasons pertaining to the frequencie at which the farm households consumed maize meals and amount of land that farm households allocated to growing maize and other types of food crops. Furthermore, information regarding the time in a year when the farm households start consuming maize and information regarding the farm households' persceptions concerning their food security status, reasons for the perceptions and farm households' size and composition was also collected.

Data analysis

Data was analyzed using the SPSS program, which required coding and capturing of the participants' responses. Frequencies were calculated in order to find the number of scores per response. FAO's (1968) estimates for the quantities of nutrients that can be found in 100g of ground sifted maize in Africa were used for determining amounts of nutrients that the farm households in Katumba ward can access through maize consumption. The amount of nutrients that the farm households in Katumba ward obtain from maize consumption per meal was calculated through converting the average amount of maize flour that farm households in Katumba ward utilize per meal into grams, followed by dividing the result by 100 g, then multiplying the obtained figure by FAO's (1968) estimated figures for the quantity of each nutrient in 100 g of maize flour: Likewise, the estimated percentage of the energy that farm households obtain from maize was calculated using the following equation:

Percentage of the daily required energy that the farm household obtains from maize =

$$\frac{\text{Amount of energy that can be obtained from maize per day}}{\text{Total energy that a household requires}} \times 100$$

The percentage of protein that a farm household in Katumba ward can access from maize was calculated based on the amount of

[1] The questionnaire that was used for the interviews was tested on 10 farm households which were excluded from the study, thus the sample households were selected from 2639 farm households.

Table 1. Size of land (in acres) that the farm households allocated for food crops.

Food crop	Mean	Maximum
Magimbi/Taro (*Colocasia esculenta*)	0.299	2.00
Potatoes	0.059	1.00
Sweet potatoes	0.217	0.75
Bananas and plantains	0.536	2.00
Cassava	0.061	2.00
Legumes	0.456	2.50
Vegetables	0.242	1.50
Maize	1.609	6.00

maize flour that a farm household consumes per meal, and the Food and Nutrition Board, Institute of medicine of the National Academies' (2005) estimates for the amount of required protein per individual. Thus, the estimated percentage of protein that a farm household in Katumba ward can get from maize per day was calculated using the following equation:

Percentage of the daily required protein that the farm household obtains from maize =

$$\frac{\text{Amount of protein that can be obtained from maize per day}}{\text{Total amount of protein that the household requires per day}} \times 100$$

Moreover, the total amount of maize that the farm households produce annually in Katumba ward was calculated by multiplying the average amount of maize sacks[2] that a farm household in Katumba ward produces per year by the total number of farm households in the ward.

RESULTS AND DISCUSSION

Sizes of land allocated for different food crops in Katumba ward

Table 1 presents the findings for the size of land that the farm households allocated for each food crop.

Type of maize grown and type of maize meal that the farm households used most

As with other parts of Rungwe district, farm households in Katumba ward grow white maize, often in scattered plots. The farm households produced an average of 8.77 maize sacks each, amounting to a total of 23231.71 maize sacks produced in Katumba ward per annum, which is equivalent to 2323 tons of maize. All of the 260 farm households that participated in this study indicated that they start consuming maize prior to harvest when it is still green in the fields. During this time maize ears are roasted or boiled, then whole kernels of maize are eaten.

[2]As with the other parts of Rungwe district, in Katumba ward one sack can accommodate an estimate of 100kg of maize.

It was also found that after the maize is harvested, all of the farm households that participated in this study preferred the type of maize meal called 'ugali' above others. 'Ugali' is the type of maize meal made from sifted ground maize, and is always eaten concurrently with meat, fish, legumes, vegetables, sour milk known as 'maziwa ya mgando' in Swahili or with meat and vegetables, fish and vegetables or legumes and vegetables. As shown in Figure 1, all of the farm households in Katumba ward often consumed maize meals concurrently with other types of food.

The frequencies at which farm households consume maize meals

The numbers of maize meals that farm households consume per day and per week are as presented in Figures 2 and 3. While the mean, standard deviation and standard error for the number of maize meals that the farm households consume per day was 1.79, 0.581 and 0.036 respectively, the mean, standard deviation and standard error for the number of days in a week during which the farm households consume maize was 6.16, 1.45 and 0.09, respectively. The mean for the total number of meals that the farm households in Katumba ward consume per day was 2.83, standard deviation was 0.389 and standard error was 0.024. Furthermore, while Figures 2 and 3 show that the majority of the farm households in Katumba ward consumed maize meals twice per day, Figure 3 shows that the percentage of farm households that consumed maize meals seven days per week is the highest.

The percentage of the farm households that consume a total of two or three meals per day is as shown in Figure 4.

The amount of maize flour that the farm households utilize per meal

The amount of maize flours that farm household that took part in this study consumed per meal ranged from 0.5 to 3 kg. The mean was 1.13, standard deviation was 0.46 and standard error was 0.03.

Farm households' perspectives regarding the importance of maize

It was found that the importance of maize meal to farm households in Katumba ward is based on several perceptions shown in Figure 4.

The amounts of nutrients that can be obtained in maize in Africa

The World Food and Agricultural Organisation (FAO) estimates that 100 g of maize in Africa would consist of

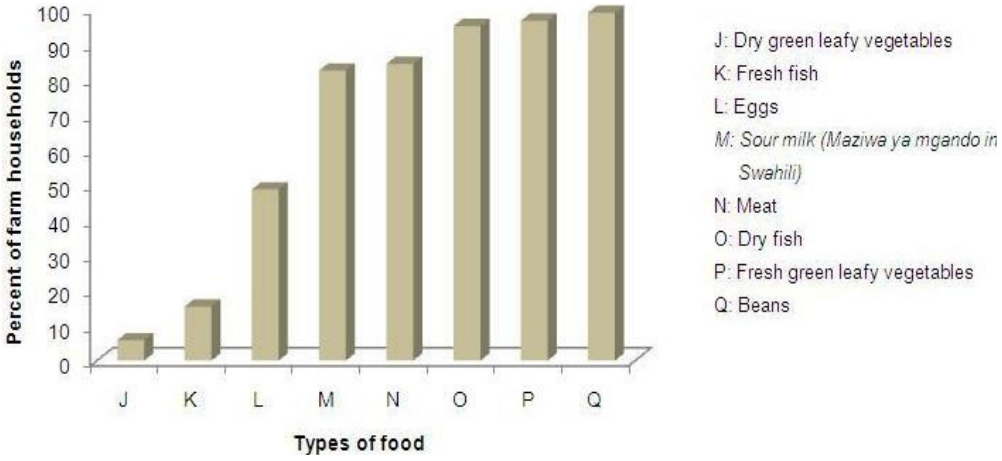

Figure 1. Types of food that the farm households in Katumba ward eat concurrently with maize meals.

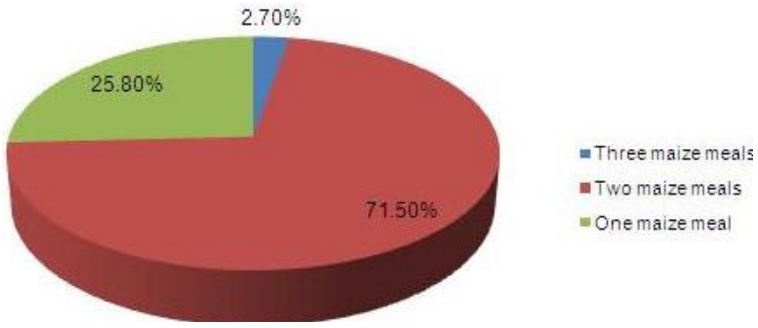

Figure 2. The number of maize meals that the farm households in Katumba ward consume per day.

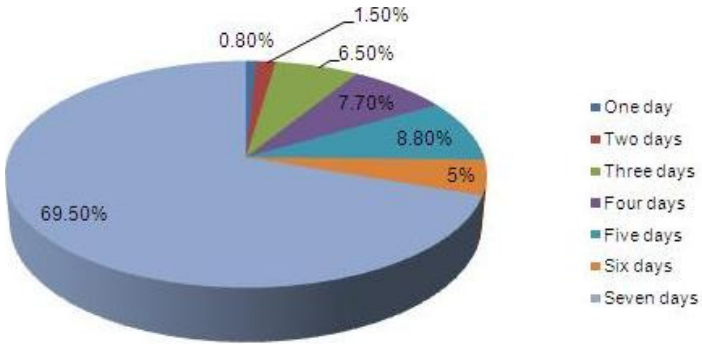

Figure 2. Number of days per week during which the farm households consume maize meals.

several types of nutrients (FAO, 1968) presented in Table 2.

Size and composition of the farm households in Katumba ward

Farm household size ranged from 2 to 16, with 5.65 mean and 2.096 standard deviation. While the number of female adults in the farm households ranged from 0 to 3, the number of male adults ranged from 0 to 2. The mean for the number of female and male adults in the farm households was 1.18 and 0.92, respectively; standard deviation was 0.489 and 0.38, respectively. Moreover, the number of male children aged above 18 years in the

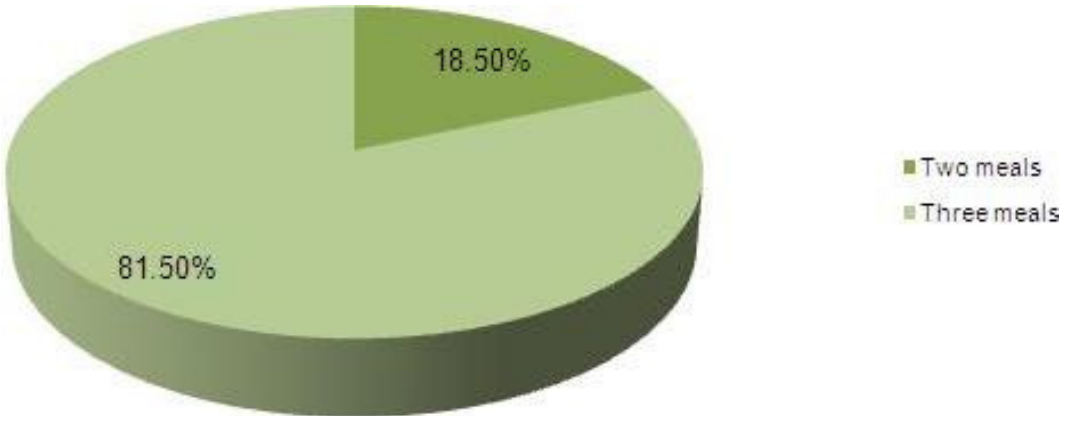

Figure 1. Total number of meals that the farm households consume per day.

farm households ranged from 0 to 6 and the number of male children aged below 18 years ranged from 0 to 7, with mean 0.48 and 1.37, respectively, and standard deviation 0.783 and 1.224, respectively. The number of female children aged above 18 years ranged from 0 to 5, and the number of female children aged below 18 years also ranged from 0 to 5. While the mean for the aforementioned was 0.34 and 1.4, respectively, standard deviation was 0.646 and 1.048, respectively.

After rounding off, the aforementioned figures show that an average farm household in Katumba ward consisted of one male adult, one female adult, one male child aged above 18 years, one male child aged below 18 years, one female child aged below 18 years and no female child aged above 18 years. The total number of people per farm household would be five or six. These figures are slightly higher than the average of 4 people per household indicated by Tanzanian government reports (Mbogoro, 2003). In the light of the aforementioned, there are more maize consumers per household in Katumba ward than what the Tanzanian government records suggest.

The importance of maize as a source of food in Katumba ward

The farm households in Katumba ward regarded maize as more important than other food crops. This argument is partly based on the outcome of the comparison of the size of land that each farm household in Kaumba ward allocated for maize with the magnitude of land that the farm households allocated for other crops. The findings in Table 1 reveal that the farm households in Katumba ward allocated more land to growing maize than what they allocate for growing each of the other types of food crops. Acres of land that farm households allocated for other crops ranged from 0 to 2, while maize was allocate up to six acres of land, which imply that maize was the most preferred food crop. Furthermore, the importance of maize as a source of food was also realized through investigating the frequency at which the farm households in Katumba ward consumed maize meals. In the light of the findings in the study, the total number of meals that the farm households in Katumba ward consumed per day equals 2.83 ± 0.024, which equals 2.864 or 2.806, which is equivalent to 3 after rounding off. Thus, farm households in Katumba ward consumed an average of three meals per day. Also, the average number of maize meals that the farm households in Katumba ward consume per day equals 1.79 ± 0.036, which equals 2 after rounding off, and the average number of days per week during which the farm households consumed maize meals equals 6.16 ± 0.09, which equals 6 after rounding off.

In the light of the previous discussion, the farm households consumed maize meals at least once per day in an average of six days per week, and two out of three meals that the farm the households in Katumba ward consumed per day were made from maize. This shows the immense importance of maize as a source of food and as a contributing factor to reducing chances for the farm households in Katumba ward to experience hunger, which impacts on the farm households' food security status. In the light of FAO's (2008) definition of food security, the availability of preferred food is an important component of food security, which maize fulfils in Katumba ward.

The nutritional importance of maize in Katumba ward

As indicated in the data analysis section, the amount of nutrients that the farm households in Katumba ward obtained from maize per meal was calculated through converting the average of 1.1308 kg of maize flour that farm households in Katumba ward utilized per meal into grams, followed by dividing the result by 100 g, then multiplying the obtained figure by FAO's (1968) estimated

Table 2. Estimated amounts of nutrients in 100 g of sifted ground white maize in Africa.

Nutrient	Amount
Energy (Cal)	368.00
Protein (g)	9.40
Fat(g)	3.30
Carbohydrates(g)	74.10
Fibre(g)	1.00
Ash(g)	1.00
Calcium (mg)	18.00
Phosphorus(mg)	178.00
Iron(mg)	3.30
Thiamine(mg)	0.26
Riboflavin(mg)	0.08
Niacin(mg)	1.00

Table 3. The estimated amounts of energy and nutrients from maize that farm households in Katumba ward can obtain per day.

Nutrient	Amount of nutrients per meal	Amount of nutrients per day	Amount of nutrients per week (six days)
Energy (Cal)	4161.344	8322.688	49936.128
Protein(g)	106.295	212.590	1275.542
Fat(g)	37.3164	74.633	447.797
Carbohydrates(g)	837.923	1675.846	10055.073
Fibre (g)	11.308	22.616	135.696
Ash (g)	11.308	22.616	135.696
Calcium(mg)	203.544	407.088	2442.528
Phosphorus(mg)	11.308	22.616	135.696
Iron(mg)	37.316	74.633	447.797
Thiamine(mg)	2.940	5.880	35.281
Riboflavin(mg)	0.905	1.809	10.856
Niacin(mg)	11.308	22.616	135.696

figures for the quantity of each nutrient in 100 g of maize flour in Table 2 as follows:

$$\frac{1.1308\ \text{kg} \times 1000}{100\text{g}}$$

$$\frac{11308\text{g}}{100\text{g}}$$

=11.308

Multiplying each of the aforementioned estimated figures for the amount of each nutrient present in sifted ground white maize by 11.308, each household in Katumba ward consumed an average amount of calories of energy and other nutrients indicated in Table 3 daily through maize meal consumption alone: In view of the estimates in Table 3, farm households in Katumba ward may obtain from maize significant amounts of nutrients that are important for health, which would impact positively on the farm households food security. However, whether these estimates apply to the farm households in Katumba ward or not depends on the degree of the quality of maize which the farm household manage to achieve through maize production and storage. In turn, this necessitates the use of efficient farming and storage technologies by the farm households in order to attain highest degree of maize quality in terms of its nutritional value and its capacity to resist infestations which affects on the nutrient content of the maize (Danilo, 2003; Lewis, et al., 2008).

While breeding technologies make it possible to improve yield (Olakojo et al., 2005) and the capacity of maize to resist infestations (Abel et al., 2000), they also make it possible to improve the nutritional value of maize through enriching it with vitamins and minerals that are

Table 1. The estimated caloric requirement per household per day where the female child and one of the male children in the household are aged 11 to 14.

Household member	Age (years)	Height (cm)	Weight (kg)	Energy (cal)
Boy	11-14	157	45	2500
Boy	19- 24	177	72	2900
Girl	11- 14	157	46	2200
Mother	27- 50	163	63	2200
Father	27- 50	176	79	2900
Total energy required				12700

Table 5. The estimated caloric requirement per household per day where the female child and one of the male children in the household are aged 15 to 18 years.

Household member	Age (Years)	Height (cm)	Weight (gm)	Energy (Cal
Boy	15-18	176	66	3000
Boy	19- 24	177	72	2900
Girl	15- 18	157	55	2200
Mother	27- 50	163	63	2200
Father	27- 50	176	79	2900
Total energy required				13200

deficient in maize such as vitamin A, zinc and iron respectively (Welch, 2002; Sands et al., 2009). In turn, the enriched maize improves the consumers' nutrition and impacts positively on their food security status. Likewise, efficient storage technologies provide the stored maize with protection against infestations, thus impact positively on the nutrient content of the maize.

The importance of maize as a source of energy for the farm households in Katumba ward

The amount of nutrients required daily per individual differs with age, sex and activity (Food and Nutrition Board, Institute of medicine of the National Academies, 2005). However, the quantities of nutrient intake recommended by the Food Nutrition Board, Institute of Medicine of the National Academies (2005) are also used as general estimates for the specified age groups of people who engaged in moderate activity (Committee in Dietary Allowances Food and Nutrition Board, 1980; Miller, 1960; Food and Nutrition Board, Institute of medicine of the National Academies, (2005). Thus in this study, the estimated quantities of nutrients that a farm household in Katumba ward could access from maize were calculated based mainly on the ages of the individuals in the farm households. In view of the findings in section 3.7, the recommended daily allowances for an average farm household in Katumba ward would be as indicated in Tables 4 and 5. Using the equation in section 2.3, and imagining that the percentage of the estimated energy that farm households in Katumba ward obtain from maize per day is equal to x, its value where the female child and one of the male children are aged 11-14 was calculated as follows:

$$x = \frac{8322.688\ \text{cal}}{12700\ \text{cal}} \times 100$$

= 69.469984 or 69.5% after rounding off

In the aforementioned calculation, 8322.688 cal is the estimated amount of energy that can be obtained from maize per day in Africa mentioned in Table 3, and 12700 cal is the amount of energy required by the relevant farm household per day in line with the estimates indicated in Table 4. Where the female child and one of the male children are aged 15 to18 years, the value of was calculated as follows:

$$x = \frac{8322.688\ \text{cal}}{13200\ \text{cal}} \times 100$$

= 66.838545 or 66.8% after rounding off

In view of the above discussion, roughly 66.8 to 69.5% of the total energy required per household in Katumba ward can be obtained from maize alone, which implies that maize contributes significantly to the food security of the farm households in Katumba ward. The aforementioned numeric figures are significantly higher than the 60% dietary energy found in records by Green (1999) and Katinila (1998) regarding the amount of energy that consumers obtain from maize in Tanzania.

The importance of maize as a source of protein in Katumba ward

Based on the estimated amounts of nutrients that the Food and Nutrition Board, Institute of medicine of the National Academies (2005) has provided for people of specific age groups, the estimated amounts of the required protein that the farm households in Katumba ward should be able to consume daily are as shown in Tables 6 and 7. In view of the information in 'The amount of maize flour that the farm households utilize per meal' and in the light of the estimates in Table 6, each of the farm households in Katumba ward can obtain an average of 212.59g of protein from maize daily. Therefore the percentage of accessible protein from maize meals for a farm household which requires 236g of protein per day was deduced through converting the amount of protein that a farm household in Katumba ward may obtain from maize into a percentage against the total amount of protein required by the household based on the figures indicated in Table 6 concerning the characteristics of

Table 6. The estimated protein requirement per household per day where the female child and one of the male children are aged 11 to 13 years.

Household member	Age (Years)	Height (cm)	Weight (kg)	Protein (gm)
Boy	11-13	157	45	34
Boy	19- 24	177	72	56
Girl	11- 13	157	46	34
Mother	27- 50	163	63	56
Father	27- 50	176	79	56
Total protein required				236

Table 7. The estimated protein requirement per household per day where the female child and one of the male children in the household are aged 15 to 18 years.

Household number	Age (Years)	Height (cm)	Weight (kg)	Protein (gm)
Boy	15-18	176	66	52
Boy	19- 24	177	72	56
Girl	15- 18	157	55	46
Mother	27- 50	163	63	46
Father	27- 50	176	79	56
Total protein required				256

members of the farm household as follows:

$$\frac{212.590\ g}{236\ g} \times 100$$

= 90.081 or 90% after rounding off

Likewise, where the female child and one of the male children in the household are aged 15 to 18 years, the percentage of protein that a farm household in Katumba ward may obtain per day through maize meal consumption would be as follows:

$$\frac{212.590\ g}{256\ g} \times 100$$

= 83.043 or 83% after rounding off.

Thus a farm household in Katumba ward may obtain an estimate of 83 to 90% of the daily required protein from maize meal alone! This renders maize a very important source of protein for the maize consumers in the ward, and an important food crop where the farm households' food security in Katumba ward is concerned. In fact a lot more protein and other nutrients such as fats minerals and vitamins can be obtained from maize consumption when whole grains of maize are consumed without being subjected to the milling process. During milling, some of the nutrients are lost when bran is removed (Hoseney, 2000; Klopfenstein, 2000). This in turn reduces the nutritional value of the end product (Hoseney, 2000; Klopfenstein, 2000). However, since in Katumba ward the farm households start consuming maize while it is still green in the fields, it is possible for the farm households to obtain a lot more of protein and other nutrients from maize than when they utilize milled maize.

The importance of maize with respect to the nutrients that the farm households may access indirectly through maize consumption

As indicated in Table 3, a number of nutrients that are necessary for health can be obtained directly from maize through its consumption. In Katumba ward, maize also promotes access to nutrients that are either not available in maize or available in small quantities. This argument is based on the findings in Table 1, which reveal that at the time when the study was conducted, the majority of the farm households in Katumba ward often ate maize meals concurrently with beans, fresh green leafy vegetables, dry fish, meat, and sour milk known as 'maziwa ya mgando' in Swahili. The findings in Table 1 also reveal that a significant percentage of the farm households also ate maize meals concurrently with eggs

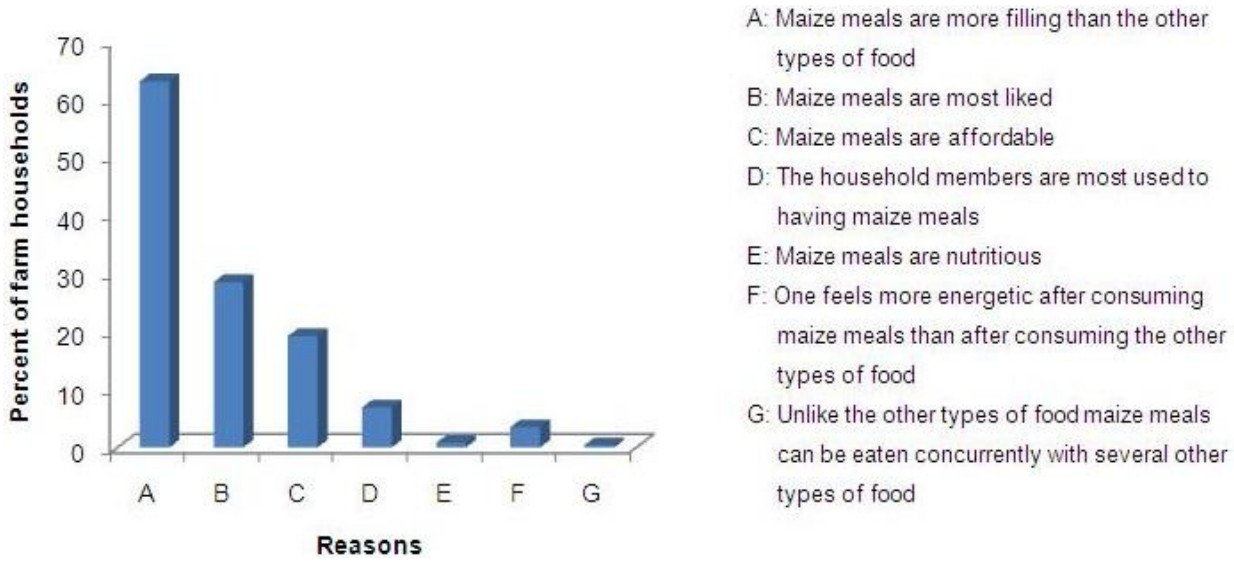

Figure 2. Reasons for which the farm households in Katumba ward prefer maize meals.

on a regular basis. Meat, fish, eggs, beans and milk are good sources of protein (FAO, 1992; 1999; Ofuya and Akhidue, 2005), thus although the protein found in maize is not high quality (Friedman, 1996), the farm households may complement the protein found in maize with the quality protein found in the foods indicated previously when they consume them concurrently with maize meals.

Likewise, green leafy vegetables are good sources of vitamins, minerals and roughage (Miller, 1960; Singh et al., 2001; Flyman and Afolayan, 2006). Thus the farm households in Katumba ward could access the above nutrients through eating maize meals together with the other types of food mentioned previously. More nutrients such as fats and vitamins are obtained from ingredients that are added to foods when foods that are eaten with maize meals are cooked. In general, nutrients that are obtained from foods that are eaten together with maize meal add value to the diets and improve food security of the consumers. In this way, maize made an indirect positive influence on nutrition and household food security of the farm households in Katumba ward.

The importance of maize based on the farm households' perceptions

Figure 5 shows that the perception that 'maize meals are more filling than the other types of food' had the highest scores, which implies that the farm households in Katumba ward preferred maize meals due to the farm households' perception that maize meals are more filling than the other types of food. In the light of the food security definition and the previous discussion, in Katumba ward maize also influences household food security through offering preferred food to the farm households and through reducing chances for consumers to experience hunger. However, in order for farm households in Katumba ward to maximize the use of the nutrients found in maize it is imperative that the maize be of good quality. This implies that among other factors, farming and storage technologies that the farm household in Katumba ward use be efficient enough to keep stored maize safe from infestations and contaminations, and in order to achieve this, agricultural policy that promote quality of maize is necessary.

Conclusion

Maize is the most important food crop in Katumba ward and maize it influences the farm households' food security. The factors that have led to maize being considered to be important in Katumba ward include: Farm households perceiving maize meals as more filling than the other types of food, the ease of the availability of maize meals and flexibility with respect to the other types of food that maize meals can be eaten concurrently with. In Katumba ward maize contributes directly to the enhancement of household food security through offering the farm households preferred food, through the nutrients that are available to the farm households from maize meals consumption and indirectly through enabling the consumers to access necessary nutrients through foods that are eaten together with maize meals.

On a daily basis, the farm households in Katumba ward can access from maize about 66.8 to 69.5% of the total required energy and 83 to 90% of the total required protein and small quantities of other nutrients such as calcium and phosphorus. The ease of maize availability in Katumba ward and its capacity to be filling also

contributes to household food security in this ward through reducing chances for the farm households in this ward to experience hunger. The degree to which maize is important in the diets of the people in Katumba ward necessitates that maize be of good quality in terms of its nutritive value and that it should be free from infestations and contaminations, which in turn necessitates that efficient farming and storage methods be available to the farm households.

ACKNOWLEDGEMENTS

Our sincere gratitude to the International Development and Research Centre (IDRC) for funding the field work for this research and to Dr Mthulisi Siwela and others who have not been mentioned here for offering help in one way or the other.

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