A nutritional assessment of teachers in one education district in Zimbabwe

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Abstract

The study sought to assess the food consumed and the nutritional status of teachers in one education district in Zimbabwe. Underpinned by the positivist research paradigm, the study followed a quantitative research approach in which a descriptive survey design was utilised. A convenience sample of 62 teachers participated in the study. A structured questionnaire was employed to collect data, based on a three-day food record. Descriptive statistics were used to analyse data and analysed data were presented in tables, figures and graphs. The study found that most teachers did not consume food adequately from at least two food groups. The majority of teachers did not consume adequately from the milk and fruit groups while consumption in the grain and vegetable group lacked variety. Food consumption in the meat group was generally adequate and a variety of foods were consumed. The Body Mass Index (BMI) data revealed that 35% of the males and 36% of the females were at risk of being overweight or obese while 4% of the males and 9% of the females were at risk of being underweight. The rest (61% males and 55% females) had normal weight. Inadequate consumption of foods in some food groups accompanied by lack of variety in other food groups leaves most teachers at risk of several nutrient deficiency diseases. There is need to provide nutrition education to teachers to make them aware of cheaper nutrient dense dishes and the importance of physical activity in the promotion of good health.

Key words: nutrition. Dietary requirements. Health. Food availability. Nutrient deficiency.

Introduction

The living standards of the majority of people including the working class in Zimbabwe, has declined in recent times due to various factors. The major factor cited by Nyathi (2009) is low salaries, especially for the majority of Zimbabweans which was on average US$200 per month in September 2009. In some schools', teachers were also paid extra money by the community because their salaries could not sustain a living. According to the same source, the government did not have a reliable source of income and hence the Minister of Finance, appealed to civil servants not to embark on a strike. The government of Zimbabwe published that in January 2009, a family of five members required US$177 for food only. This, according to the researcher's observations, could not be afforded by many people including those in the working classes. The Consumer Council of Zimbabwe reported that an average family of five required US$495 per month in August 2009 (Nyathi, 2009; de Kock, 2009).

The researcher also felt that the harsh economic environment had an impact on the eating patterns of most households. With regards to some workers, it was likely to have negatively affected civil servants especially teachers who mainly relied on their salaries to earn a living. The salary of US$155 in September 2009 was far below the poverty datum line such that they refused to go to work when schools opened on the first of September 2009 (Nyathi, 2009; de Kock, 2009). Most communities could not afford to pay extra money to the teachers because of extreme poverty. The researcher witnessed that most teachers were struggling to pay fees for their children in boarding schools. He felt teachers were important in raising the economy of a nation and if their basic psychological needs such as food were not satisfied, they would be unable to perform their duties effectively. Alternatively, they could look for greener pastures elsewhere within the nation or even outside the country with the aim of regaining their lost status as educators of future generations.

For the reasons described above, it could be argued that teachers were possibly not eating foods that belonged to some food groups as stressed in the Food Guide Pyramid. Their nutrient intakes were conceivably below the daily requirements when compared with the Food Guide Pyramid and dietary nutrient intake recommendations of the United States Department of Agriculture (USDA). The Food Guide Pyramid suggests that people should consume adequate amounts of cereals and grains, fruits and vegetables, milk and milk products, meat and legumes and that fats and sugars be consumed sparingly (Bobroff 2009; USDA 2007).

Literature Review

The study was guided by the Food Guide Pyramid which is an important tool in nutritional assessment which suggests how much of each food category one should consume daily (Carter & Lewsen, 2004; USDA, 1996). It provides a variety of foods which should be consumed from each food group as well as appropriate number of servings considered to be adequate to maintain good health and reduce the risk of nutrition-related diseases (Goldberg *et al.,* 2004; Wardlaw & Insel, 1996). Wardlaw and Insel (1996) indicate that variety is important because the required nutrients are found in different concentrations in different food types. The same authors also emphasize the moderate intake from each food to balance the nutrient intake.

Bobroff (2009) and USDA (2007) also reveal that the USDA released a food guide consisting of four levels but that there are different food groups in each of the levels. The four levels consist of six food groups. However, quantities to be consumed are only specified for the five food groups. The most common Food Guide Pyramid was issued in 1992 by the USDA and the United States Department of Health and Human Services (USDHHS) (Goldberg *et al.,* 2004). It is further stated that this pyramid was developed after extensive research and testing. The Food Guide Pyramid is published every five years and an update to the 2005 system was expected by 2010.

Role of the Food Guide Pyramid

The Food Guide Pyramid provides guidelines on healthy diets and may be used in menu planning. It can also be used in nutrition counselling and in nutrition education campaigns. Merchant, Chifamba, Terera and Yusuf (2005) argue that the Food Guide Pyramid may be used as a standard database which may be compared with the actual intake in assessing adequacy of food intake. In this study, the Food Guide Pyramid was thus used as a standard. The actual food intakes of respondents in terms of servings were compared with Pyramid recommendations for the five food groups in which quantities to be consumed are

specified. Variety of intake from different food groups was also assessed since the Pyramid emphasises the intake of a variety of foods to meet the nutrient requirements. The servings in the Pyramid were important in determining individuals who consumed less or more than their requirements.

Description of the Food Guide Pyramid

The Food Guide Pyramid shows various food groups important in maintaining a healthy diet.
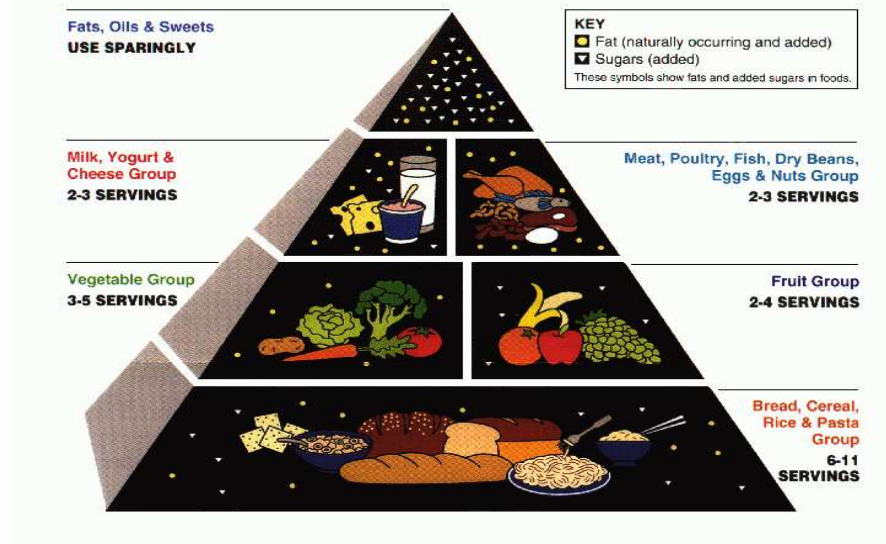

Figure 1: Food Guide Pyramid (adapted from Schlenker & Gilbert 2015).

USDA (2007) divides food into six categories shown in the Figure 1. These include the Breads, Cereals, Rice, and Pasta Group (Grain Group) at the base of the pyramid. Grains supply food energy in the form of starch. According to the Pyramid, energy giving foods must be supplied in greatest amounts than any other foods. This is why they are at the base of the pyramid to visually guide people that the foods in the group should be consumed in greatest quantities. The recommended numbers of servings from this group are 6 to 11 as indicated in Figure 1. The group contains naturally occurring and added fats indicated by circles in the pyramid as well as added sugars represented by triangles.

The Fruit Group and the Vegetable Group are one step up the pyramid. The fruits such as bananas, apples and oranges supply natural sugars, fibre, and vitamins and are low in calories and fats (Haywood 2005). Fruits may be fresh, frozen, canned, dried or juiced. Vegetables contain many vitamins and minerals (Bobroff, 2009; Schlenker & Gilbert, 2015). The above sources indicate that the concentration of vitamins and minerals vary in different vegetables. This suggests that different types of vegetables must be consumed to obtain the required quantities of vitamins and minerals. Green vegetables contain vitamin A, dark orange and dark green vegetables contain vitamin C, and vegetables like broccoli are good sources of iron and calcium (Schlenker & Gilbert, 2015). The same sources also indicate that the green and orange colour of vegetables is caused by vitamins. A diet rich in fruits and vegetables reduce various cancers, heart diseases and stroke (Schlenker & Gilbert, 2015). Although vegetables and fruits are at the same level, the Pyramid suggests that vegetables must be consumed in greater quantities than fruits. The Pyramid visually indicates that vegetables must be consumed in greater quantities than fruits by a wider trapezium for vegetables than for fruits. The recommended numbers of servings are 3 to 5 from the vegetable group and 2 to 4 from the fruit group.

At the third level are the Milk, Yogurt, and Cheese Group and the Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts Group. Milk and dairy products are rich in calcium but also provide protein, phosphorous, vitamin A and vitamin D (Gibson, 1993; Schlenker & Gilbert, 2015). Many dairy products are also high in saturated fats and cholesterol which are not good for health. Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts are major sources of protein as well as iron zinc and vitamin B12. Meats, like dairy products, are also high in saturated fats and cholesterol (Bobroff, 2009). However, the fats may be trimmed off to minimize saturated fats and cholesterol. The number of Pyramid servings recommended from these two groups at the third level is the same and this is visually indicated by the same trapezium sizes in the Pyramid. The recommended numbers of servings per day are 2 to 3 from each group.

At the tip of the Pyramid are fats, oils, and sweets which should be used in small quantities to avoid excess energy and/or fat which may cause diabetes, high blood pressure and cancers (Gibson, 1993; Schlenker & Gilbert, 2015). The group contains only naturally occurring and added fats indicated by circles in the pyramid as well as added sugars represented by triangles. Foods in this group must only be consumed sparingly.

Amounts equivalent to a Serving in the Food Guide Pyramid

Food intakes are measured in servings where a serving refers to a standard portion of that particular type of food or drink. Table 1 shows the various groups in the Food Guide Pyramid and amounts equivalent to a serving for various food types.

Table 1: Food Groups and amounts equivalent to a serving (Adapted from USDA 2006).

Food Group	Amount Equivalent to a Serving	Food Group	Amount Equivalent to a Serving	
Grain food	1 slice bread. ½cup cooked cereal/pasta. 1cup: ready-to-eat cereal.	Meat, fish, eggs, nuts and legumes	85g meat, poultry or fish. 1 Egg. 1 cup cooked Legumes.	
Vegetables especially green vegetables, red or yellow	½ cup cooked vegetables. 1 cup raw vegetables.	Milk and milk products: cheese, yoghurt	1 cup milk/yoghurt 56g cheese. 1 cups ice cream.	
Fruit	Medium size fruit. ½ cup of fruit juice.			

However, this study diet was classified into four categories. A "good" diet was one where an individual consumed almost adequate Pyramid recommendations from almost all food groups. A "somewhat good" was one where an individual consumed recommended Pyramid servings from 3 or 4 food groups. A diet where average Pyramid consumption from at least three food groups was inadequate was described as "poor inadequate" while a diet where consumption from at least three food groups was far more than the recommended amounts was described as "poor excess".

Dietary Assessment Methods

Gibson (1993) gives four important stages in dietary assessment that may be used to assess nutrient intake. These include (1) measurement of the amount of food eaten, (2) calculation of the nutrient content of the food consumed, (3) assessment of absorbed nutrients and (4) the evaluation of nutrient intakes in relation to standard recommendations. The methods of assessing food consumption of individuals can be quantitative or qualitative.

Brook (1982) and Block (1982) highlight that quantitative dietary assessment may include recalls or food records designed to measure the quantity of individual foods consumed over a period of one day. Individual's pattern of food intakes can be obtained by taking measurements over several days or measuring the consumption over a long period of time (Gibson, 1993). Quantitative dietary assessment methods include the twenty-four-hour recall and the three-day food record which was also used in this study.

Food Records

Food records are used to estimate food consumption at household level (Sothern, Gordon & von Almen, 2006). They provide detailed information about food products including brand names and methods of preparation. Respondents record at the time of consumption all foods and beverages consumed for a specified period. Portion sizes can be estimated using cups, spoons or can be weighed using a balance (Sothern, Gordon & von Almen, 2006). The above source indicates that weighing provide the most accurate information. However, not all individuals have balances to weigh everything which they consume. Moreover, the process of weighing which the participants might not like to do, can be laborious and time consuming. Food records also have the advantage of eliminating the problem of trying to recall the foods eaten (Boyle & Morris, 1999). Furthermore, the amount of food eaten may be calculated or estimated by weighing. However, Gibson (1993) and Block (1982) assert that the diet record method may result in errors in recording. To minimise this problem, respondents must be highly motivated, literate and well trained. Goyings and Csete (1994) also emphasise the importance of training respondents in order to collect more reliable information on dietary assessment. According to a comparative study by Crawford, Obarzanek, Morrison and Sabry (1994), the 3-day food records provide more accurate data than both the 24-hour recall and food frequency questionnaire.

Block (2000) observes that three days of diet data are required for the most stable nutrients and percentage of calories from fats. Other macronutrients and micronutrients would require more days. Schlenker and Gilbert (2015) as well as Boyle and Morris (1999) advise that seven or eight day dietary records would give a meaningful estimate of an individual's intake. The researcher feels that this is only practical when collecting data for a few individuals.

The issue at hand

Exercise and a balanced diet are needed to maintain a healthy body. However, due to the economic conditions that were and are still prevailing in the country, it was felt that most of the teachers could not be consuming adequate foods from some of the food groups of the Food Guide Pyramid, hence, some nutrients could be lacking in their diet and consequently resulting in malnutrition. If the situation is prolonged, it could affect their health and consequently their levels of effectiveness in the performance of their important duties. This could have some adverse effects in the development of the community and the nation at large since there could be high absenteeism and high failure rate in schools. The

researchers intended to determine the adequacy of food intake by teachers and recommend appropriate measures to be taken to improve their food intake and consequently their health.

Purpose of the Study

In light of the problems highlighted above, this study intended to investigate the various types of foods consumed by teachers and the number of servings consumed per day from different food groups of the Food Guide Pyramid. This would also establish whether their intake of carbohydrates or fats is normal or not, through the determination of number of servings of food consumed from different food groups.

Significance of the Study

The study focused on the consumption of foods from various food groups. It is likely to reveal current risks of nutrient deficiencies or excesses. This information would benefit the teachers and Zimbabwe as a nation. When teachers are made aware of their nutritional risks, they may adjust their eating patterns to reduce the risks. This has the effect of eventually increasing their health status, life span as well as their service period and efficiency in duty performance since absenteeism due to nutritionally associated disorders would be low. The nutritional knowledge will also be essential in decision making. Thus, it would also benefit policy makers. The policy makers could recommend that the teachers' salaries be increased whenever it becomes available so as to promote quality education. It could also assist donor organisations to include teachers in most of their food programmes if deficiencies are noted. The teachers could also be assisted to initiate some projects that may help them to improve their nutritional status.

Objectives of the Study

The objectives of this study were to:

1. determine the types of food eaten by teachers in schools that were within 5km from Murewa centre with reference to the Food Guide Pyramid.
2. estimate the adequacy of food consumed by teachers in schools that were within 5km from Murewa centre.

Delimitations

The study focused on five schools that were within 5km from Murewa Centre in Mashonaland East Province. It included both males and females who were available, willing and motivated to provide nutritional information. Nutritional assessment method that was used is a 3-day food records

Methodology

Methodology refers to the process of finding answers to research questions. It includes the research design, population, sample size and selection, research instruments, validity and reliability of the instruments, data collection and analysis procedures. The methodology that was used in this study is discussed below.

Research Design

The study was a cross-sectional survey. According to Hopkins (2008), a cross-sectional survey is one in which variables of interest are measured once and the relationships between them are determined (Neill, 2003). It deals with figures or quantities and gives more emphasis on measuring variables. A quantitative research design was appropriate for this study as it enabled quantities of foods consumed to be measured. Determination of quantities was important since these were then compared with standard values to assess the adequacy of food intake. The survey also enabled the researcher to use a large sample size (n=49) making the results statistically significant. Furthermore, large amounts of data could be easily collected from a variety of people. Moreover, surveys were relatively cheaper and easy for the researcher to administer.

The Population

Population refers to the set of individual units, respondents or things that have characteristics of interest to the researcher (Maxwell 2005). It is the largest group of individuals from which data is collected (Labovitz & Hagedorn, 1981). Murewa District has 82 primary schools and 35 secondary schools giving a total of 117 schools. According to the July 2009 statistics that were available in Murewa District Education Office in September 2009, primary schools had 541 males and 540 females while secondary schools had 318 males and 190 females. There were 859 males and 730 females giving a total population of 1589 teachers in all schools.

Sample Size and Selection

A sample is a representative portion of the population and is representative when it allows results of the sample to be generalized to the population (Maxwell, 2005). In quantitative research, probability sampling methods or non-probability sampling methods can be used (Neill, 2003). The researcher used a non-probability sampling method where schools which had common features in Murewa District were identified. The researcher also considered issues of accessibility and transport costs. This method encompassed the descriptions for purposive and convenience sampling given by Neill (2003). The sample consisted of 5 schools within 5km from Murewa centre. However, distance was not measured since there was no map for the schools in the district. The schools considered had a total of 77 teachers. A total of 62 teachers were available and willing to provide the information. However, 57 instruments were completed and returned. There were 30 instruments from females and 27 from males. Eight of the instruments were considered to be invalid due to incomplete data. The instruments from 27 males and 22 female teachers were considered to be valid and were analysed in all sections. The total sample size was 49. The sample size was still large enough to provide meaningful and accurate data even after invalidating eight of the instruments.

Research Instruments

The 3-Day Food Record was used to collect data. The 3-day food record was selected because of its ability to provide more accurate data as was revealed by Crawford *et al.,* (1994). Respondents were to record quantities consumed at the time of consumption. This reduced the scope of possible errors in estimating of quantities. According to Boyle and Morris (1999) the 3-day food record is considered the "gold standard" as it eliminates the problem of trying to recall what was consumed and the researcher felt that it would provide

the required information in the study. The researchers anticipated that the costs would be low and manageable and the data collected would be more accurate due to the 3-Day Food Record design. Participants were considered to be well educated and were motivated to complete the questionnaire. The fact that respondents were highly literate also helped the researcher to select the 3-day food record as an instrument for data collection. The respondents easily understood what they were to do after receiving only a few instructions.

Validity and Reliability

Boyle and Morris (1999) define validity as the ability of the assessment instruments to measure what they are intended to measure. The word accuracy can be used inter-changeably with validity. Boyle and Morris (1999) indicate that factors that affect validity of an instrument include: characteristics of respondents such as literacy levels, education level, ability to follow instructions and conscientiousness in completing instrument; questionnaire design for example, difficulty of instructions, ease of recording intake and the number and types of foods listed; adequacy of reference data and accuracy of data coding.

To ensure validity, simple instructions were given on the instrument. The sample size was large, and the respondents were highly literate and could read, understand and provide accurate information. The format of the instrument was clear and comprehensive. All foods eaten were recorded since the recording was done during the time of consumption. To ensure accuracy in quantity estimation a food list with 'quantity measures' such as cups and spoons were available in the instrument to help respondents in their estimations. Respondents had the opportunity to measure and record the daily intakes in their homes. Pilot testing of the instrument was done to find the feasibility of the instrument. Five teachers who were not part of the selected sample were involved in the pilot test. The lead researcher selected teachers who stayed close to his home in pilot testing of the instrument. This minimized the costs. The respondents successfully completed the instrument but they had few problems which were solved by training respondents on how to complete the instrument just before data collection. The 3-Day Food Records included two work days and a weekend. A weekend was included as the diet could be different from the one during the week which is affected by work schedules. The inclusion of a weekend could give a true reflection of the actual diet of respondents. An average for the number of servings was calculated for each food group in order to improve the validity of the results (Boyle & Morris, 1999).

Boyle and Morris (1999) state that precision; repeatability and reproducibility are synonymous with reliability. This refers to the ability of an instrument to produce the same estimates of dietary intake on separate occasions, provided the diet did not change in the interim. It is further highlighted that reliability is affected by the respondents' ability to estimate their dietary intake properly. One respondent was trained in each school to act as a research assistant. He/she then trained others on how to complete various sections of the instrument to improve the accuracy of the information provided. The measures discussed above to ensure validity also established reliability.

Data Collection Procedures

Respondents were given the 3-Day Food Record instrument and instructions were clarified by the research assistant who was available in the school for any further questions. Respondents filled in demographic.

Data Presentation Analysis and Discussion

Data analysis was done using Microsoft Excel. This programme captures, codes and sort data making it easier to compare and contrast. Tables, figures and graphs were used to analyse data.

Demographic Data

The percentages of males and females in various age-groups are shown in Table 2 and the sample size was 49 teachers. Most of the respondents (55%) were males. The remainder (36%) were females. Five (5) males and 6 females were in the 21 to 30 age-group, 10 males and 11 females were in the 31 to 40 age-group and the remainder (12 males and 5 females) were in the above 40 age-group. Males were more than females due to the eight instruments from females which had invalid data. All respondents were teaching at day schools in a rural area. Two of the schools (one primary and one secondary school) were in Murewa Centre, whereas other three schools (two primary and one secondary) were about 5km from the growth point.

Table 2: Percentages of males and females in various age-groups. (n=49).

	Age-Group (years)				
	21-30	31-40	Above 40	Totals	Percentages
Males	5	10	12	27	55
Females	6	11	5	22	45
Totals	11	21	18	49	100
Percentages	22	42	36	100	

Considering schools at different distances from the growth point could give a true picture of the types of diets of the day school teachers in various schools in Murewa district.

Types of Foods Eaten by Teachers

This section presents different types of foods consumed from different food groups over the three-day period. The average Pyramid servings consumed per day per individual were calculated by finding the sum of the servings consumed by all individuals for the specific type of food. The sum of servings was then divided by the product of total number of respondents (49) and the data recording period (3 days). For the most commonly consumed food groups, the variety of foods consumed by each individual was noted. For the least consumed food group (milk group), the percentages of individuals consuming Pyramid servings within certain ranges were also determined.

Average servings consumed per day

Servings consumed from each food group by each individual over 3 days were summed up using the summation option in Microsoft Excel. The average servings consumed by each person in each food group were them obtained by dividing the total servings by 3.

Bread, Cereals and Starches Group

Table 3 shows the most commonly consumed foods in the bread, cereals and starches group. The most commonly consumed foods were sadza (pap) and bread where the average numbers of Pyramid servings consumed per day were 5.5 and 2.9 respectively. The average Pyramid servings consumed for rice per day was 0.96. The average from sweet potatoes was 0.21 and 0.19 for Irish potatoes. Sadza (pap/maize) and bread were probably the cheapest or most readily available among foods in this group.

Table 3: Average number of servings consumed per day for foods in the bread, cereals and starches Group. (n=49: 3 day average)

The bread, cereals and starches Group	Average Servings consumed by each person per day
Sadza (pap)	5.5
Bread	2.9
Rice	0.96
Sweet potatoes	0.21
Irish potatoes	0.19

The Vegetable Group

The most commonly consumed vegetables are illustrated in Table 4. The average number of Pyramid serving consumption per day for the most commonly consumed vegetable (covo/rape) was 1.57 whereas those for tomatoes, cabbage, butternut and carrots were 0.85, 0.66, 0.29, and 0.16 respectively. Many vegetables were consumed in significant proportions. A number of minerals and vitamins were probably satisfied by consumption of the vegetables. Covo and/ rape were probably more readily available than other vegetables.

Table 4: Average number of servings consumed per day for foods in the fruit, vegetable and meat groups. (n=49: 3-day average)

The Vegetable Group	Average Servings consumed by a person per day	The Fruit Group	Average Servings consumed by a person per day	The Meat, Eggs & Nuts Group	Average Servings consumed by a person per day
Covo/rape	1.57	Pawpaw	0.94	Beef/Pork/Mutton	1.62
Tomatoes	0.85	Wild fruits	0.47	Chicken	0.43
Cabbage	0.66	Orange	0.41	Peanut butter	0.42
Butternut	0.29	Avocado pears	0.22	Beans/peas/soya beans	0.37
Carrots	0.16	Fresh Apples/pears	0.13	Kapenta	0.35
				Roundnuts/groundnuts	0.32
				Eggs	0.21

The Fruit Group

Table 4 above also shows the different fruit consumption levels during the data collection period. The largest proportion of the servings consumed in the fruit group was from pawpaws. Oranges and wild berries were also consumed in relatively larger quantities than other fruits over the three days. Generally, foods in this group were also not adequately consumed by the majority of respondents. The teachers were at risk of being deficient in several micronutrients as well as vitamins. Foods in this group could be unavailable or expensive in the area.

Meat, Eggs and Nuts Group

Table 5 also shows the summary of the average Pyramid servings of Meat, Eggs and Nuts Group consumed per day. All respondents indicated that they had food from the Meat Group at least once in 3 days. Most of the Pyramid servings consumed in this group were from beef, pork, and/or mutton. Chicken, peanut butter and various legumes also had significant contribution to the total Pyramid servings consumed in the Meat Group. Many types of foods in this group were consumed by the majority of respondents. Foods in this group could be more readily available at an affordable price.

The Milk Group

Table 5 shows the average number of Pyramid servings in the milk group consumed by various proportions of respondents. Foods in the milk group were the least consumed among all the food groups over the data collection period. A substantial number of respondents (42.9 %) did not consume anything in the milk group. Others (26.5%) consumed very low quantities of less than 0.5 servings per day on average. A relatively small percentage (18.4%) of teachers consumed an average number of servings between 0.5 and 1 per day. Average numbers of Pyramid servings above 1 per day were only consumed by 12.2% of the respondents. The most commonly consumed milk foods were cow's milk with an average consumption of 0.3 servings per day per individual and lacto with an average consumption of 0.2 servings per day. Insignificant amounts were consumed from cascade and yoghurt. A few types of foods were consumed by respondents from this group. The majority of the teachers did not consume adequately from the milk group and could be at risk of osteoporosis which results from calcium deficiency. Milk could be too expensive or unavailable in the area.

Table 5: Average number of Pyramid servings in the milk group consumed by the respondents. (n=49, 3-day average)

Average number of Pyramid servings consumed	Number of individuals	Percentage of individuals
0	21	42.9
< 0.5	13	26.5
0.5 to 1	9	18.4
>1	6	12.2
Totals	**49**	**100**

Variety of foods consumed by respondents

As illustrated in Figure 2, the majority of respondents consumed 2 or 3 different vegetable types over three days. Four percent (4%) consumed less than two different types, whereas 8% consumed 4 and 16% consumed more than 4 different types of vegetables within 3 days. The majority of respondents obtained different types of micronutrients. Only a small proportion of respondents did not obtain a wide variety of nutrients from the vegetable group. A very small proportion did not consume anything from the vegetable group. These could be at risk of developing several nutrient deficiency diseases due to deficiency of micronutrients. Lack of variety in consumption could be due to lack of knowledge in nutrition, unavailability of foods or high costs of foods.
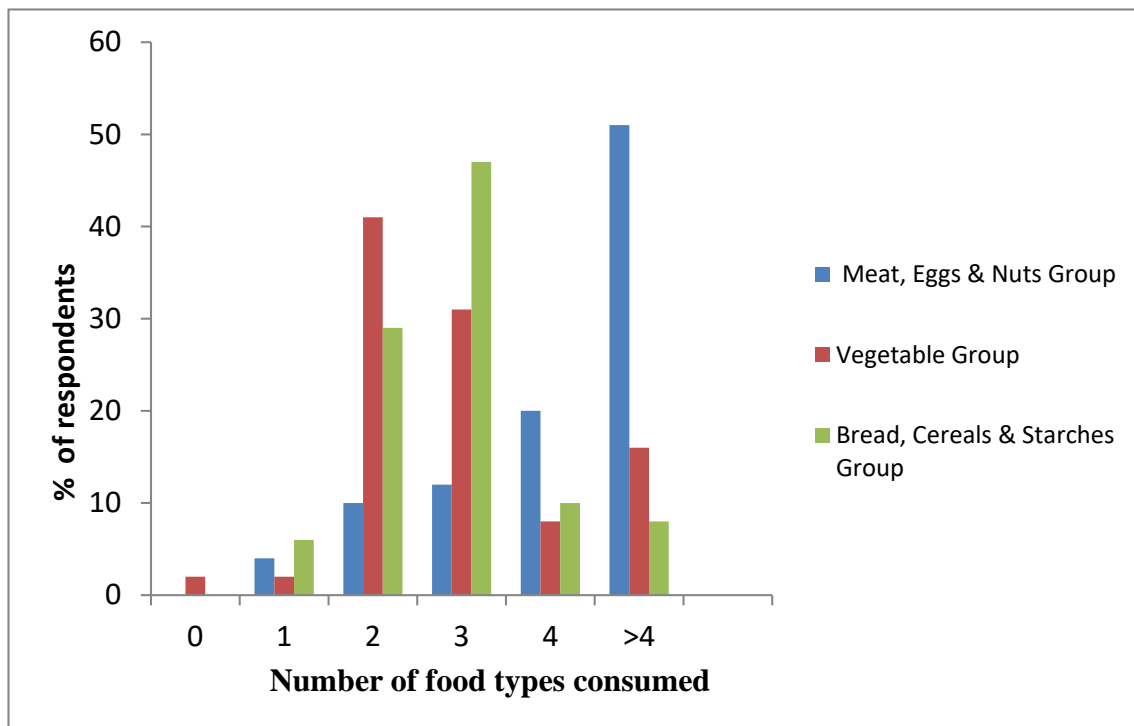

Figure 2: Number of different types of foods in the Vegetable; Bread, Cereals and Starches and Meat, Eggs and Nuts Groups consumed by respondents over 3 days. (n=49)

The statistics for the variety of foods consumed in the nuts, eggs and meat group are represented graphically in Figure 2. Most (83%) of the respondents consumed a wide variety (3 or more different types) of foods in the nuts, eggs and meat group within 3 days. Only a small proportion (4%) ate only one type of food whereas 10% consumed 2 different types of foods in the nuts, eggs and meat group. The majority of respondents were obtaining most of the essential and non-essential amino acids whereas only a small proportion were not getting some of the essential amino acids due to lack of variety in the foods consumed in the meat, eggs and nuts group. There is need to complement foods to cater for the nutrients lacking in a particular food.

The majority of respondents (47%) consumed three different types of grains over three days as illustrated in Figure 2. A significant number (29%) consumed two different types of foods from the bread, cereals and starches group whereas only relatively small proportions consumed one (6%), four (10%) and greater than four (8%) different types of

foods from the same group. Individuals consuming a variety of foods from the different food groups could be meeting their nutrient needs by a complementary process.

Miscellaneous Group

All the respondents, except two reported that they consumed iodised salt every day. The average intake was 0.59 teaspoons per individual per day per person. The average number of teaspoons consumed from sugar was 2.78 teaspoons, while that for margarine was 0.86 teaspoons per day per person. Foods in this group are consumed sparingly. This avoids the problems such as Coronary Heart Diseases (CHD) associated with excess intake of fats and salts**.**

Adequacy of Food Intake

This section presents information on average Pyramid servings consumed by male and females in various age-groups for the different food groups. It also indicates the types of diets consumed by teachers and presents data on percentages of individuals consuming at least the minimum number of Pyramid servings in each food group as well as percentages of individuals consuming less than the minimum Pyramid recommendations in various age-groups. The number of food groups that were not consumed adequately by various proportions of respondents are also shown in this section.

Average number of servings in comparison to the Food Guide Pyramid

Table 6 shows the average number of servings consumed by respondents which are compared with the Pyramid recommendations. Among all males only the average daily consumption of milk and fruits were less than the Pyramid recommendations. Females only fell short in the milk group. The majority of teachers in Murewa district did not consume adequately from the milk and fruit groups.

Table 6: How the average diet for male and female teachers in Murewa compares with the Food Guide Pyramid recommended number of servings per day for each food group. (n=49; 27males, 22 females)

Food group	Average number of servings consumed per day, 3-day average			Pyramid Recommended range of servings
	Males	**Females**	**All Individuals**	
Bread, Cereals & Starches	11.2	8.0	9.8	6 to 11
Vegetables	4.5	3.3	4.0	3 to 5
Fruit	1.5	3.3	2.3	2 to 4
Meat, Eggs and Nuts	4.2	3.6	3.9	2 to 3
Milk	0.5	0.5	0.5	2 to 3

Table 7 shows the average Pyramid servings consumed by males and females in different age-groups. The average Pyramid servings consumed by males and females in different age-groups also reveal that most of the age-groups fell short of Pyramid servings mainly in

the milk group and the fruit group. Men in the above 40 tended to consume more from all food groups than those in other age-group whereas women in the above 40 age-groups generally consumed less than women in the age-groups below 40. Males in the 21 to 40 age-groups and females in the above 40 age-group are critically at risk of being deficient in minerals and vitamins since their average Pyramid consumption fell short in the milk as well as the fruit group. Women in the 21 to 30 age-group consumed significantly high quantities of foods in the meat, egg and nut group. These could be getting excess of the nutrients obtained in this food group.

Table 7: Average number of Pyramid servings consumed by males and females in different age-groups.

Food Group	Average number of Pyramid servings consumed					
	Males			Females		
	age-groups			age-groups		
	21 to 30	31 to 40	Above 40	21 to 30	31 to 40	Above 40
Bread, Cereals & Starches	8.30	11.17	12.44	7.67	8.83	6.60
Vegetable	3.32	3.24	6.03	3.44	3.67	2.23
Fruit	0.40	0.57	2.75	5.78	2.81	1.54
Meat, Eggs & Nuts	2.40	3.80	5.40	12.65	3.67	2.73
Milk	0.03	0.51	0.71	0.78	0.47	0.27

Percentage of individuals consuming at least the minimum and less than the minimum Pyramid recommendations

The number of individuals consuming less than or greater than certain limits were obtained using the "countif" formulas in Microsoft Excel since the data was analysed using Excel.

Figure 3 illustrates the percentage of males and females consuming at least the minimum number of Pyramid servings from each food group. The percentage of individuals consuming less than the minimum number of Pyramid servings from each food group is also illustrated in the same Figure. This was obtained by subtracting the percentage of respondents consuming at least the minimum number of servings from 100.

A significant number of both men and women were falling short of the recommended number of daily Pyramid servings from several food groups. About 96.3% and 95.4% of men and women respectively were consuming less than the minimum number of Pyramid servings from the milk group. In the fruit group, 85.2% males and 72.7% females were consuming less than the minimum Pyramid recommendations. In the vegetable group, 37% of the males and 50% of the females were consuming less than the Pyramid recommended number of servings per day. In the meat group, 22.2% of the males and 22.7% of the females fell short of the recommended Pyramid servings. The starches group only consists of 11.1% males and 22.7% females who were consuming less than the Pyramid serving recommendations.
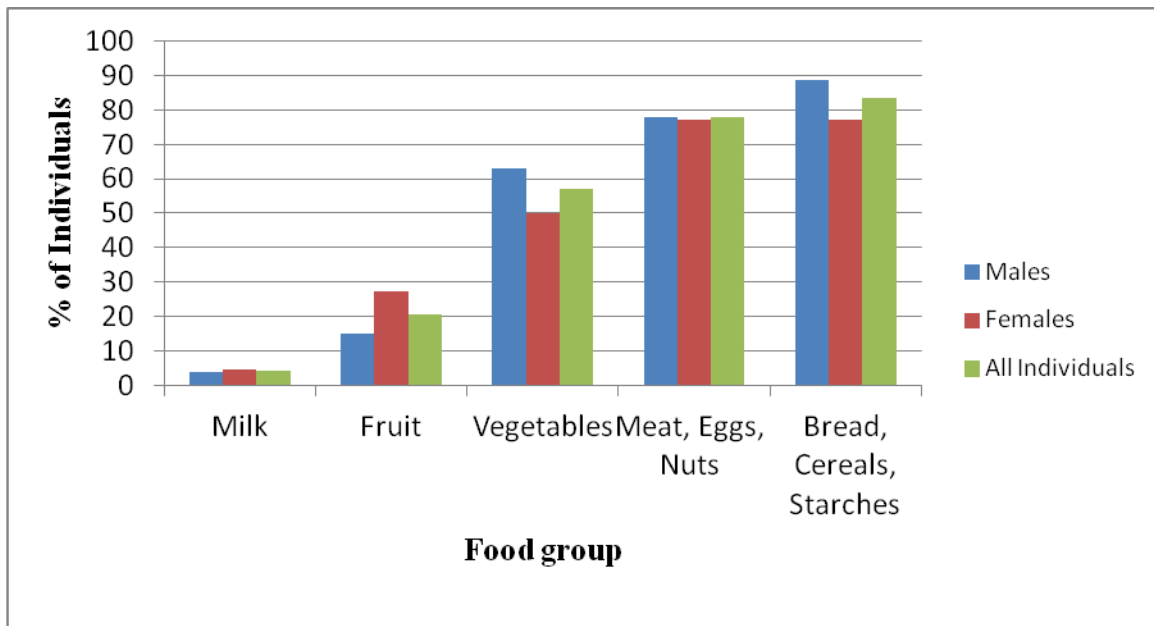
Figure 3: Percentage of individuals consuming at least the minimum number of Food Guide Pyramid servings per day. Minimum number of servings from milk group 2; fruit group 2; vegetable group 3; nuts, eggs and meat group 2; bread, cereals and starches group 6 (USDA, 2007). (n=49, 3-day average)

Figure 3 shows the percentages of individuals in various age-groups who did not consume adequately from a variety of food groups. Among individuals aged 21 to 30, (20.4%) consumed less than the minimum recommended number of servings per day for both milk and fruits whereas 10.2% and 8.2% did not meet the recommendations for vegetable; and meat, eggs and nuts groups respectively. Only a small proportion (4.1%) did not meet the minimum pyramid recommendations in the bread, cereals and starches. This puts these teachers at the risk of suffering from protein energy malnutrition.

Among individuals in the 31 to 40 age-group; 42.9% in the milk group; 34.7% in the fruit group; 18.4% in the vegetable group; 14.3% in the meat, eggs and nuts group and 6.1% in the bread, cereals and starches group failed to consume the minimum Pyramid recommendations. Among individuals above 40, 32.7% did not meet the Pyramid recommendations in the fruit group while 24.5% fell short of daily Pyramid serving's recommendations in the vegetable group. For the vegetable group and bread, cereals and starches group, 14.3% fell short of the minimum recommendations in each group.

Macronutrients were generally well consumed by the majority of teachers. Only a small proportion of teachers in the selected district were likely to be deficient in carbohydrates as well as proteins. The problem of protein and energy malnutrition is only likely among a small proportion of teachers.
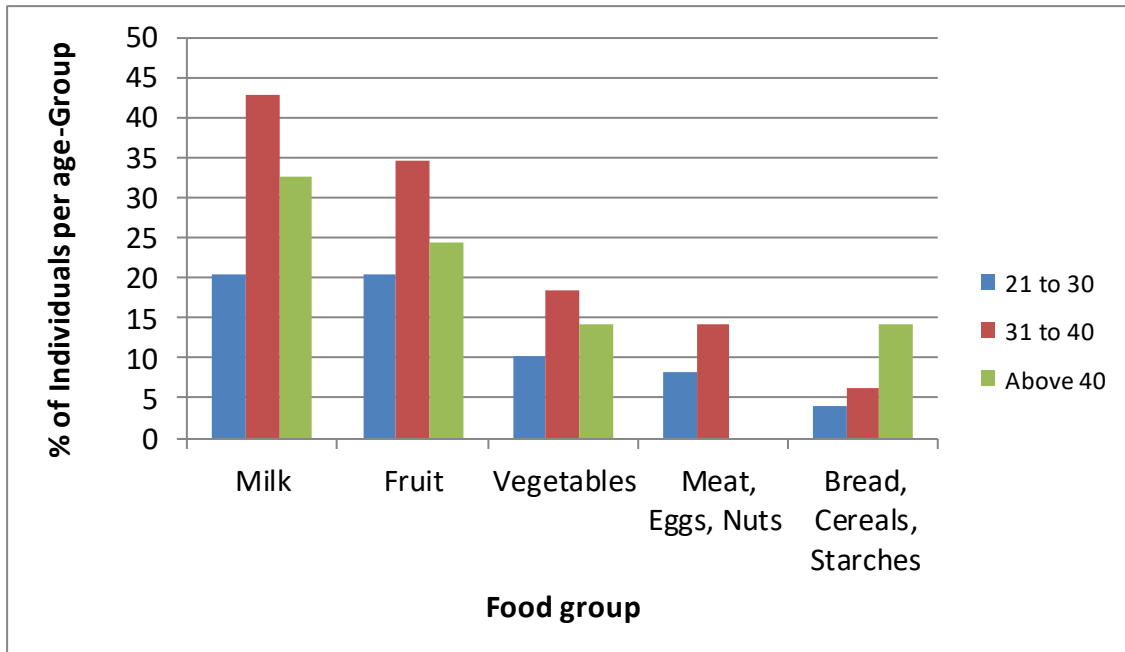
Figure 4: Percentage of individuals consuming less than the minimum number of Food Guide Pyramid servings per day in different age-groups (n=49)

Figure 5 Illustrates the number of food groups that were inadequately consumed by various proportions of respondents. The majority (36.8%) of teachers consumed less than the minimum Pyramid recommendations from two food groups. Significantly large proportions of respondents consumed average food servings less than the minimum Pyramid recommendations from three (24.5%) and four (20.4%) food groups. A very small percentage of respondents (2%) failed to consume adequately from all the five food groups and only 4.1% consumed almost adequately from all the five food groups. The proportion of respondents who did not consume adequately from at least three food groups is critically at risk of nutrient deficiency diseases.
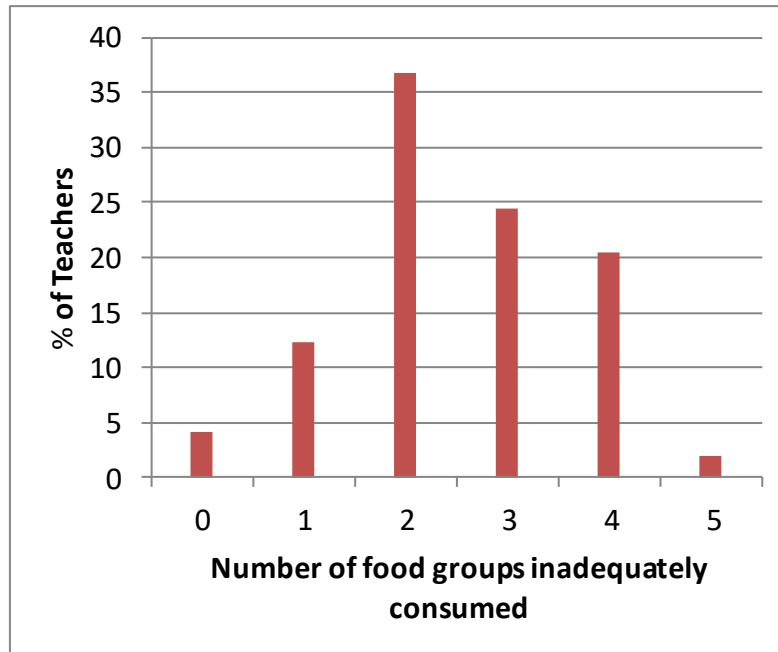
Continues…

Figure 5: Number of food groups where the average amounts consumed was less than the minimum Pyramid recommendations for various percentages of respondents (n=49, 3-day average)

Types of diets consumed by respondents

Table 8 shows the type of diets and proportions of teachers consuming each type of diet. The majority of teachers did not follow the dietary recommendations illustrated by the Pyramid. Only 4.1% ate a good diet as the servings in all food groups were almost within the range of the Pyramid recommendations. The diet of those who had 3 or 4 average food group servings within the range of the Pyramid recommendations was described as "somewhat good".

The diet of those who had average servings below the Pyramid recommendations in at least 3 food groups was described as "poor inadequate". The diet of teachers who had average servings above the Pyramid recommendations in at least 3 food groups was described as "poor excess". Most of the teachers (59.2%) had a "somewhat good" diet while 30.6% had a "poor inadequate" diet. Only 6.1% of the teachers had a "poor excess" diet. The diets for teachers in Murewa were generally not good.

Table 8: Types of diets consumed by various proportions of respondents (n=49)

Type of Diet	Proportion of respondents	
	numbers	Percentages
"Good"	2	4.1
"Somewhat Good"	29	59.2
"Poor Inadequate"	15	30.6
"Poor Excess"	3	6.1
Totals	49	100.0

17

Discussion

Research findings reveal that foods in the bread, cereals and starches group had the highest number of respondents whose average serving consumption was above the minimum Pyramid serving recommendations per day. This could be due to the low prices or availability of food staffs in this group. Most of the teachers (47%) consumed three different types of foods in the bread, cereals and starches group over the 3-day period. However, for almost all of the respondents, the largest proportion of Pyramid servings consumed per day was obtained from sadza and bread (5.5 and 2.9 servings per day/individual respectively). The researcher was not surprised since his experience in the community revealed that sadza and bread were consumed almost on daily basis by the Zimbabwean population. Merchant *et al.* (2005) revealed that sadza is the staple food in Zimbabwe. The researcher also observed that maize is grown by many people including teachers in their effort to minimize the costs of food. This means that mealie-meal used to cook sadza (pap) was probably readily available. It is important that intake from the bread, cereals and starches group is adequate as foods in the group provide energy essential for all energy consuming processes in the body. Goldberg *et al.,* (2004) and Wardlaw and Insel (1996) indicate that foods in the bread, cereals and starches group form the base of the Pyramid and should be consumed in greatest proportions (6 to 11servings per day).

Foods in the milk group were generally not consumed at all over the 3-day period by a very large proportion of respondents (42.9%). The average Pyramid servings per day for both males and females were far below the recommendations (2 to 3 servings per day). According to Gibson (1993) and Bobroff (2009) milk and its products are very rich in calcium. Hence, the inadequate intake of dairy foods means low calcium intake. However, calcium may also be obtained from vegetables like broccoli and okra (Taylor *et al.,* 1997 and Bobroff, 2009). However, vegetables like broccoli are rarely available in Murewa or they may not be known to be a source of calcium. The research data also revealed that some of the individuals did not consume adequate Pyramid servings from both the milk and vegetable groups. Such individuals could be at risk of nutrient deficiency diseases. These could be at risk of diseases like osteoporosis which results in weak bones due to low calcium intake in the diet. This could also result in complications if a fracture could occur.

More than 75% of both male and female teachers consumed less than the minimum Pyramid serving recommendations in the fruit group. According to Doyle (1994) and Bobroff (2009) fruits and vegetables supply many vitamins and minerals as well as fibre. A variety of food choice is important in ensuring that a diet contains sufficient minerals and vitamins (Wardlaw and Insel, 1996, Goldberg *et al.,* 2004, and Bobroff, 2009). A diet with much variety of foods in different foods meets the nutrient needs by a complementary process. In addition to inadequate consumption of the foods in the fruit group, variety was also not achieved in both the fruit group as well as the vegetable group. A significant proportion of the teachers (41%) consumed only two different types of vegetables, namely tomatoes and covo or rape. According to several case studies carried out by the Department of International Development (2005), the vegetables that were mostly consumed by teachers were those that were observed to be grown in larger quantities by many people in gardens in rural communities. The observation that foods from the milk and fruit group were not adequately consumed and the lack of variety among the vegetables consumed by teachers means that most teachers could be at risk of being deficient in a number of minerals as well as vitamins. This affects their health and may increase absenteeism from work. Their efficiency is reduced and the failure rates in schools may be high if the effects of poor diets are already being experienced by teachers. If food is not accessible due to high prices and low salaries, teachers could be involved in other activities outside the schools in an effort to meet their

basic needs. This also increases absenteeism and failure rates in schools. The researcher observed other teachers crossing to borders of different countries purchasing items for resale in Zimbabwe and make profit in an effort to make ends meet.

A significantly high proportion of respondents (more than 75%) consumed at least the minimum number of Pyramid servings per day in the nuts, eggs and meat group. A wide variety of foods in the nuts, eggs and meat group were also consumed by a very large proportion of respondents. This was good for maintaining themselves in a healthy state. Most of the individuals (14.29%) who did not consume adequately from this group were in the 31 to 40 age group. Foods in the meat group play a critical role in maintaining one's health. For example, metabolism requires enzymes made from proteins and the immune system is also largely dependent on proteins (Taylor *et al.,* 1997). Lack of proteins results in wasting (weight loss). Excess proteins can also be metabolized to give carbohydrates which supply the body with energy (Taylor *et al.*). Due to the diverse range of functions performed by proteins, it is critical that they are supplied in sufficient quantities. Consumption from variety was important in ensuring adequate intake of all the essential amino acids (Fox and Cameroon, 1995). Other respondents combined grains and legumes in their diets. This is commendable as it was important in meeting the demand of essential amino acids by a complementary process (Walker, 1992). However, a small proportion of respondents (28.6%) included fish in their diets. According to Wang, *et al.,* (2006) fish contain omega- 3-fatty acids which aid to reduce cholesterol levels as well as platelet aggregation in arteries. This generally reduces heart problems. This group of respondents is encouraged to continue with the good diet.

The average servings consumed from the meat, eggs and nuts group by males and females in different age-groups were above the minimum Pyramid recommendations. This was quite amazing. Nyathi (2009) indicates that teachers' salaries were far below the bread basket in September 2009. The researcher expected a much lower consumption from the meat group due to the alleged low salaries of teachers. He believes that some of the foods in the meat, eggs and nuts group are generally expensive. The researcher suggests that foods in the group could be readily available. The respondents are urged to continue the adequate intake of foods in this group. The overall mean consumption per day from all food groups was not significantly affected by the few outliers due to large sample size as well as the 3-day length period of data collection. The average was almost the same even after excluding outliers.

Results of the investigation indicate that the diets of most teachers did not match the Food Guide Pyramid recommendations. The majority consumed less than the Pyramid recommendations especially in the milk and fruit groups. The researcher suggests that this inadequate intake could be due to the unaffordability of the foods as a result of low salaries or the foods could have been unavailable in the area when the research was conducted. The researcher recommends that respondents should consume goat's milk and indigenous fruits when they are in season. Respondents were probably unfamiliar to the Food Guide Pyramid. This assumption was made because the few respondents who had access to plenty food consumed far more than the Pyramid recommendations. The issue of adequate and balanced intake emphasized by Goldberg *et al.,* (2004) and Wardlaw and Insel, (1996) was not observed, as some, though few, of the individuals consumed an average of as much as 31 servings per day in one food group. This was quite amazing. This is an indication of lack of sufficient nutritional information among the elite group of the society. The individuals were at risk of multiple diseases associated with excess intake of nutrients and hence obesity in some.

A similar investigation carried out with an adult population in America, also indicated that individuals did not eat according to the Pyramid recommendations (Goldberg *et al.,* 2004).

Similarly, foods in the milk and fruit group were among those that were not adequately consumed. However, the American population consumed more fats as well as refined carbohydrates. The investigation also revealed that women above 40 years of age had lower average dietary intakes than those below 40. The investigation by Bartali *et al.,* (2003) had similar results. Bartali *et al.,* suggested that low dietary intakes could be attributed to chewing problem which arise with age. According to the same source, the problem may lead to monotonous and energy restricted diet. Women could be eating less at the expense of their children and husbands.

Conclusion

Findings of the study suggest that teachers across age-groups could be at risk of malnutrition. The problem could be more severe in older women. The researcher suggests that older women probably had more children at secondary school and hence the meagre salary was insufficient to afford them decent and adequate meals. Research has also proved that older women eat less at the expense of their children and husbands. Contrary, males above 40 tended to consume more servings from all food groups than those in lower age-groups. Generally, the average Pyramid serving consumption for males is greater than that for females in all food groups except the fruit group. The researcher suggests that the males were probably involved in several energy demanding activities as they tried to get extra cash to support their families. They consumed more from different food groups in an effort to get more calories. Research has also proved that men are served larger portions at the expense of their spouses and children. The researchers' experience in the Zimbabwean culture also proved that men are served larger proportions than the rest of the family in general.

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