

Perceptions of Quantity and Quality of Fibre in Food Intakes: A Case of Adults in Chawama and Kanyama Townships in Lusaka District

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ABSTRACT

Dietary fibre has health benefits. Dietary fibre is required for proper functioning of digestive system and keeping it healthy. Dietary fibre is responsible for prevention and cure of constipation and diverticular disease. It also decreases the risk of developing unhealthy conditions of the heart, stroke, hypertension, obesity, cancer of the colon. While it is assumed that intake of dietary fibre is considered, it is the adequacy of dietary fibre taken that matters. This study established perceptions of quantity and quality of fibre utilized in diets among adults in Kanyama and Chawama townships in Lusaka District. It determined nutritional knowledge on fibre and showed how adults' perceived fibre contained in their food intake. A quantitative descriptive correlational study was used to ascertain the relationship between characteristic variables and the extent to which they differ. In this case, correlation determined quantity, quality and perceptions of fibre in food intake. Findings revealed that adults had insufficient knowledge about the presence and amount of fibre in given food items. Correlation between quantity and quality of fibre varied according to food items. Some of the cases indicated positive correlation which was weak because all the Pearson r noted were below .40 while others showed an inverse association. While some adults utilized fibre in their diets, others did not. Their perceptions of fibre determined quantity and quality of its inclusion in their diets. A few adults utilized enough fibre which was of good quality whereas others were found to be inadequate in the utilization. Conclusions drawn from this study are indicative of poor perception and utilization of fibre among many adults. Recommendations were made to National Food and Nutrition Commission to intensify nutrition education among community members. Ministry of Education, Science, Vocational and Early Education was urged to include nutrition as a compulsory subject of study in pre- and primary schools to enable communities learn about quantity and quality of food intake.

Key Words: *Perceptions, fibre, quantity, quality, food intake, nutrition knowledge*

INTRODUCTION

A balanced diet is one which includes all required nutrients and non-nutrient substances. Adults are ever exposed to varieties of food likely to exacerbate adverse health conditions. Adults' increase intake of a variety of food types make them become prone to malnutrition diseases, which is worrying. People are exposed to a food environment that favours the prevalence of these diseases (Garcia-Meseguer, Delicado-Soria and Serrano-Urrea, 2017). Perceptions of types of food and how they are used to enhance good health, is taken for granted in some cases. While some people are knowledgeable about food and how it is used in the body, others are not. With an environment which is ever flooded with a variety of food, the need for nutrition education cannot be over emphasized. People need to be equipped with nutrition knowledge so that they can make informed decisions on types of food required to promote good health. Efforts are being made on teaching people about nutrients, but very little is done on non-nutrient food. A diet containing basic nutrients is supposed to be improved by including non-nutrient food that promote not only good health, but also accelerate bodily functions.

Composition of Fibre

Fibre is a component of plant material in form of carbohydrate. Fibre composition is dependent on its chemical structure which determines its forms. The chemical bonds in dietary fibre are not hydrolysed by human alimentary enzymes (Fuller, Beck, Salman, Tapsell, 2016). This is what makes fibre resistant to enzymatic digestion and absorption in the human digestive system (Dhingra, Michael, Rajput, and Patil, (2012). The forms of fibre include cellulose, non-cellulosic polysaccharides such as hemicellulose, pectic substances, gums, mucilage's and a non-carbohydrate component lignin (Trowell et al., 1985). Some of the forms of fibre dissolve in water while others do not. This is what determines solubility and insolubility of fibre. Thus, most appropriately dietary fibre is classified into two categories such as water- insoluble/less fermented fibres: cellulose, hemicellulose, lignin and the water soluble/ well fermented fibres: pectin, gums and mucilages (Anita and Abraham 1997). Dietary fibre is defined as edible plant components, analogous to carbohydrates, that are resistant to digestion and absorption in the small intestine and that undergo complete or partial fermentation in the large intestine (Fuller, Beck, Salman, Tapsell, 2016).

Sources of Fibre

Fibre is naturally present in plant food. The amount and composition of fibres differ from food to food (Desmedt and Jacobs 2001). Sources of dietary fibre include plant products such as cereals,

legumes, vegetables, fruit, nuts and seeds (Fuller, Beck, Salman, Tapsell, 2016). Some types of food contain more amounts of fibre than others. Insoluble fibre is found in some vegetables and fruit, whole grains and wheat bran Soluble fibre is found in some fruits like apples and oranges, vegetables like carrots, okra and eggplant, oats, barley, psyllium, and legumes like beans and lentils.

Therapeutic Functions of Fibre

Fibre is one of the functional foods that is instrumental in helping the body to perform certain functions properly. While fibre is found in some of the food eaten on a daily basis, it is the quantity and quality which needs to be taken into account. It is important to eat a variety of fibre-rich foods to get the health benefits of both types of fibre.

Dietary fibre not only provide satiety, but it also promotes conformity to healthy eating (Chambers, Macrickerd and Yeomans, 2015). Diets rich in fibre such as cereals, nuts, fruits and vegetables have a positive effect on health since their consumption has been related to decreased incidence of several diseases (Fuller, Beck, Salman, Tapsell, 2016). Dietary fibre has beneficial physiological effects including laxation, and/or blood cholesterol attenuation, and/or blood glucose attenuation' (Phillips and Cui, 2011b).

A fibre-rich diet is lower in energy density, often has a lower fat content, is larger in volume and is richer in micronutrients. This larger mass of food takes longer to eat and its presence in the stomach may bring a feeling of satiety sooner, although this feeling of fullness is short term (Rolls et al. 1999).

Fibre is instrumental in stool formation as regards its consistency. It improves bowel functioning and relieves constipation. Fibre acts as a protective factor in cancer of the large bowel by shortening transit time, thus reducing the time for formation and action of carcinogens. In addition, through its stool-bulking effect, fibre may lower the concentration of faecal carcinogens thereby reducing the amount of carcinogen that comes in contact with the gut wall (Hill, 1974). Llarge amount of fibre from fruit, vegetable and legumes is partly responsible for the low levels of plasma cholesterol (Anderson et al. 1973). It also lowers blood cholesterol (Fuller, Beck, Salman, Tapsell, 2016).

Ljubici et al. (2017) found out that in individuals with diabetes mellitus, higher dietary fibre intake was associated with a reduced mortality risk.

Table 1: Functions and benefits of dietary fibre on human health

Functions and benefits of dietary fibre on human health	Functions Benefits
Adds bulk to the diet, making feel full faster	May reduce appetite
Attracts water and turns to gel during digestion, trapping carbohydrates and slowing absorption of glucose	Lowers variance in blood sugar levels
Lowers total and LDL cholesterol	Reduces risk of heart disease
Regulates blood pressure	May reduce onset risk or symptoms of metabolic syndrome and diabetes
Speeds the passage of foods through the digestive system	Facilitates regularity
Adds bulk to stool	Alleviates constipation
Balances intestinal pH and stimulates intestinal fermentation production of short-chain fatty acids	May reduce risk of colorectal cancers

Source: Fuller, Beck, Salman, Tapsell (2016).

Recommended Allowance

It is suggested that healthy adults should eat between 20 and 35 g of dietary fibre each day.

Categorically, women need 25 g and men need 38 g per day. People need to eat the right amount of fibre from the food they eat. The required amount varies according to age and sex. It is also dependent on the health condition of the person. The chart below shows the recommended amount of fibre for children and adults.

Age group	Recommended amount per day
Children 1-3 years old	19 grams
Children 4-8 years old	25 grams
Boys 9-13 years old	31 grams
Boys 14-18 years old	38 grams
Girls 9-13 years old	26 grams
Girls 14-18 years old	26 grams

Men 19-50 years old	38 grams
Men 51 and over	30 grams
Women 19-50 years old	25 grams
Women 51 and over	21 grams
Pregnant women	28 grams
Breastfeeding women	29 grams

Source: Ontario Registered Dietician (2017).

Nutritional Knowledge

Adult need knowledge for them make informed decisions about their food intake. Nutrition is one of the basic needs of life which should be properly understood to sustain life. Because not food sources available are good for the body, it is advisable to know how to utilize them. Similarly, too much and too little of the types of food eaten can also be fatal to people's lives. Knowledge is a determining factor in making choices about food to eat. Nutrition knowledge has an important effect on food attitudes and behaviour, as well as on health and disease prevention. It is also crucial to look at how people interpret and use the information, as well as how it affects their behaviour (Hendrie, Coveney, Cox, 2008). This type of knowledge is best acquired by nutritional education. Not all the people are exposed to nutrition knowledge in learning institutions. Depending on areas of interest, some people learn nutrition while others do not. There is need to make a deliberate move to enable everyone attain basic knowledge in nutrition. Because nutrition knowledge influences the way people perceive their dietary practices. Roberts and Marvin (2011) note people's perception and food types as crucial factors in knowing their diets. Education and knowledge are significantly associated with healthy eating. Educated people are more likely to consume the recommended intake of healthy food, for example fruits and vegetables or food with less fat (Hendrie, Coveney, Cox, 2008). Knowledge about healthy food can significantly influence inclusion of food items which are beneficial to the body. Food rich in fibre is among the requirements attributed to enhancing good health. Despite that, knowledge about food impact on health is not of particular interest amongst the general population.

Statement of the Problem

Dietary fibre is not fully utilized in food intake among adults. Use of dietary fibre is either taken for granted as a component of food intake or perceived as irrelevant part of food. Attributed to this practice among adults are low levels of nutritional knowledge among adults about functions of

dietary fibre in bodily functions. Some of the adults eat certain types of food without knowing their full functions in the body. Inadequate use of dietary fibre among adults is worrisome because of the risk that they run to develop adverse conditions likely to incapacitate them. While food intake is a natural phenomenon, the need to ensure that adults adhere to nutritional requirements of dietary fibre in their food intake, cannot be over emphasized.

Purpose of the Study

This study aimed at ascertaining quantity and quality of dietary fibre contained in food intake among adults.

Questions

- 1) What are the demographic characteristics of adults?
- 2) What level of nutritional knowledge do adults have on dietary fibre intake?
- 3) How much fibre is contained in food that adults eat?
- 4) What are the sources of fibre in food adults eat?
- 5) What is the quantity of fibre in food sources adults eat?
- 6) What is the quantity of fibre in portions of food adults eat?
- 7) What is the quality of fibre contained in food that adults eat?
- 8) How do adults perceive fibre contained in their food intake?
- 9) Is there a relationship between quality and quantity of fibre contained in food intake for adults?

METHODOLOGY

Research Design

Research study used a quantitative tradition of inquiry to conduct the study. A descriptive correlational study allowed for testing relationships between variables.

Population and Sample Size

Population targeted were adults aged 18 years and above because they are regarded as adults and capable of deciding on what they wanted to eat. Research sites were Kanyama and Chawama Townships in Lusaka District. Sample size was 100. Adults of different education levels were selected. Stratified sampling procedure was used to select the required sample. It enabled balanced participation of different groups of adults. In an urban set up, adults had varying education levels. Gender was also another stratum which was used to select respondents. Judgemental sampling was used to select the required sample size from each stratum.

Data Collection

Data was collected using a self-reporting questionnaire. A total of 100 participants completed questionnaire consisting of 60 questions. Questions used entailed asking respondents to indicate data pertaining to their demographic characteristic, nutritional knowledge on fibre content, sources and amounts of fibre in food. Additionally, data on quality and perceptions were collected. Food frequency questionnaire for adults covered food items which are locally available in terms of vegetables, fruits, cereals, beans, nuts and seeds. Portion size was determined by estimating fibre content of food items eaten. Portion size was presented in household units, for example, number of food bowls and slices According to Neelakantan et al. 2016) standard portions were based on conceptually meaningful amounts (such as, 1 bowl) and researcher judgment. 100 participants provided their food intake as regards fibre sources. Inclusion of food in the questionnaire was based on the content contribution to dietary fibre. Local food items with fibre content were selected as measures for determining their inclusion in adults' meals per day. Intake variation and ranking of dietary fibre was ascertained by including questions on quantity and quality of food items that adults ate.

Statistical Analysis

Statistical analysis was worked out using SPSS version 23 and means (and standard deviations) were used as descriptive statistics for quantitative variables. Items on quality and quantity of fibre were scored in accordance with Likert Scale as established in the questionnaire. Pearson correlation was used to gauge relationships between quality and quantity of fibre in food intake.

Interpreting the Means in Perceived Quality and Quantity of Dietary Fibre

This study adopted a criterion weighted mean to compute rating scores for respondents' responses. Ratings were added to obtain the weighted mean scores for items. Steps below show the calculation for the weighted mean which were determined by the variables involved:

The rating scores which went up to 3 were calculated as follows:

$$3+2+1/3 = 6/3$$
$$= 2$$

The criterion weighted mean of 2 served as a determining factor for all variables involved. In this case, the variables were nutritional knowledge on content of fibre in food, sources of fibre and

perceived uses of fibre in fibre. A variable was considered to have a great impact if the weighted mean of the respondents was equal to or greater than 2. A variable was considered to have little impact if the weighted mean was less than 2.

Similarly, for the rating scores which went up to 4, the scores were added and divided by the number of the ratings as shown below:

$$4+3+2+1/4 = 10/4$$

$$= 2.5$$

The criterion weighted mean of 2.5 served as a determining factor for all variables involved. A variable was considered to have a great impact if the weighted mean of the respondents was equal to or greater than 2.5. A variable was considered to have little impact if the weighted mean was less than 2.5.

Interpretation the Means

Table 2: Nutritional Knowledge on Content of Fibre in Food

Scale	Response	Mean	Verbal Interpretation
3	Yes	2.51-3.50	Knowledgeable
2	Not sure	1.51-2.50	Moderate
1	No	1.00-1.150	Not knowledgeable

Table 3: Nutritional Knowledge on Sources of Fibre

Scale	Response	Mean	Verbal Interpretation
3	Agree	2.51-3.50	Agreed
2	Undecided	1.51-2.50	Not sure
1	Disagree	1.00-1.150	Disagreed

Table 4: Nutritional Knowledge on Quantity of Fibre

Scale	Response	Mean	Verbal Interpretation
4	High	3.51-4.50	Knowledgeable
3	Moderate	2.51-3.50	Moderate
2	Low	1.51-2.50	Less knowledgeable
1	Not Sure	1.00-1.150	Not knowledgeable

Table 5: *Quantity of Portion of Food Containing Fibre*

Scale	Response	Mean	Verbal Interpretation
4	3 portions or more	3.51-4.50	Very adequate
3	2 portions	2.51-3.50	Moderate
2	1 portion	1.51-2.50	Less adequate
1	0 portion	1.00-1.150	Inadequate

Table 6: *Nutritional Knowledge on Quantity of Fibre*

Scale	Response	Mean	Verbal Interpretation
4	High	3.51-4.50	Knowledgeable
3	Moderate	2.51-3.50	Moderate
2	Low	1.51-2.50	Less knowledgeable
1	Not Sure	1.00-1.150	Not knowledgeable

Table 7: *Quality of Fibre in Food Eaten*

Scale	Response	Mean	Verbal Interpretation
3	Always	2.51-3.50	High quality
2	Sometimes	1.51-2.50	Moderate quality
1	Never	1.00-1.150	Low quality

Table 8: *Perceived Uses of Fibre in Food*

Scale	Response	Mean	Verbal Interpretation
3	Agree	2.51-3.50	Right perception
2	Undecided	1.51-2.50	Moderate perception
1	Disagreed	1.00-1.150	Wrong perception

FINDINGS

Findings of the study were based on set questions. Demographic characteristics of respondents are presented. Thereafter, data on quantity, quality and perceptions of fibre are presented according to the given questions. A total of 100 adults completed the questionnaires.

Demographic Characteristics

Question One: What are the demographic characteristics of adults?

Table 9: Demographic Characteristics

Gender		Male	Female
		50	50
Age		Frequency	Percentage
	15-25	22	22.0
	26-35	23	23.0
	36-45	28	28.0
	46-55	19	19.0
	60 and above	8	8.0
Education Level		Frequency	Percentage
	Never been to school	15	15.0
	Lower primary	19	19.0
	Upper primary	19	19.0
	Junior secondary	13	13.0
	Senior secondary	16	16.0
	Tertiary education	18	18.0
	Total	100	100.0

Demographic characteristics are indicated in Table 8. Gender distribution was balanced by 50 males and females. In terms of age, the majority of the respondents were aged between 36 and 45 and they represented 28% while the least number were aged 60 and above and were 8%. Educationally, many of the respondents had attained lower and upper primary which indicated 19% each while the least were 13% and attained junior secondary. 15% of the respondents had never been to school while 18% attained tertiary education. Variation in education attainment among respondents is typical of an adult population found in urban areas where there are people with different education backgrounds.

Nutritional Knowledge

Research Question Two: What level of nutritional knowledge do adults have on dietary fibre intake?

Descriptive statistics were used to analyse nutritional levels of adults. Responses were analysed on a three- point Likert scale. Verbal interpretations were ordered from knowledgeable, moderate to less knowledgeable. Level of knowledge on what fibre is, where it is found and its presence in food.

Table 10: Nutritional Knowledge

Nutrition Knowledge	Mean	Std. Deviation	Verbal Interpretation
Nutrition Knowledge: Fibre is part of food	1.79	.769	Moderate Knowledge
Fibre is an important part of food	2.40	.841	Moderate Knowledge
Fibre is present in all types of food	1.69	.647	Moderate Knowledge
Fibre is not a necessary part of food	1.96	.803	Moderate Knowledge
Fibre is present in plant food	1.86	.752	Moderate Knowledge
There are different types of fibre in food	2.18	.687	Moderate Knowledge

Table 9 summarizes nutritional knowledge on presence of fibre in food items. The highest mean of 2.40 with a standard deviation of 0.841 shows that respondents were moderately knowledgeable about fibre being an important component of food, but with disagreement in their responses. Because 0.841 is close to 1.0, it is indicative of homogeneity in responses, though not closely related. The means which are above 2 are indicative of adults being knowledgeable about dietary fibre. A similar study by Spronk, Kullen, Burdon and O'Connor (2014) revealed that men and women has enough knowledge about the presence of dietary fibre in plant products. The lowest mean of 1.69 with a standard deviation of 0.647 shows that adults were less knowledgeable about the presence of fibre in all types of food with some agreement in their responses.

Quantity of Fibre in Food

Question Three: How much fibre is contained in food that adults eat?

Table 11: Quantity of Fibre in Food

Content	Mean	Std. Deviation	Verbal Interpretation
Fibre content varies according to food type	2.14	.876	Moderate Knowledge
Some types of food contain more fibre than others	2.01	.916	Moderate Knowledge
Fibre can be added to some types of food	1.97	.771	Moderate Knowledge
Average Mean			

Table 10 on nutritional knowledge about content of fibre in different types of food. The results indicate that adults were moderately knowledgeable about fibre content in types of food. The highest mean score on nutritional knowledge is above the weighted mean of 2, which is 2.14 with a standard deviation of 0.876. This is verbally interpreted as moderately knowledgeable. It implies that adults were not fully knowledgeable about fibre contained in types of food, and indicated homogeneity in their responses with some dissimilarity in the way they answered because the standard deviation of 0.876 is closer to 1.0.

Sources of Fibre

Question Four: What are the sources of fibre in food adults eat?

Table 12: Sources of Fibre

Sources of Fibre	Mean	Std. Deviation	Verbal Interpretation
Plant food contain fibre	2.25	.809	Not Sure
Unrefined food sources contain more fibre	2.08	.884	Not Sure
Vegetables are good sources of fibre	2.22	.773	Not Sure
Fruits are good sources of fibre	2.20	.791	Not Sure
Whole grains are good sources of fibre	1.73	.694	Not Sure
Beans are good sources of fibre	2.31	.800	Not Sure
Nuts are good sources of fibre	1.72	.621	Not Sure
Roots are good sources of fibre	2.01	.823	Not Sure
Average Mean			

The table 11 above on nutritional knowledge indicates that adults were moderately knowledgeable about sources of fibre contained in food. The highest mean of 2.25 with a standard deviation of 0.809 is verbally interpreted as not being sure about plant food containing fibre. Responses were homogenous indicating that adults agreed, though with some dissimilarity in their answers since the standard deviation of 0.809 is close to the value of 1.0. The lowest mean score of 1.72 with a standard deviation of 0.621 shows that adults were in agreement of not being sure about nuts being a good source of fibre. Generally, the results indicate that adults were not sure about sources of fibre. Adults need to have adequate knowledge on good sources of fibre so that they can make informed choices on food items to include in their diets. Dhingra, Michael Rajput and Patil (2012) advises that diets should have enough fibre sources from plant sources like cereals, nuts, fruits and vegetables, for good health to be attained, thereby avoid developing adverse conditions.

Quantity of Fibre

Question Five: What is the quantity of fibre in food sources adults eat?

Table 13: Quantity of Fibre

Quantity of Fibre	Mean	Std. Deviation	Verbal Interpretation
Whole grains	2.16	.788	Less knowledge
Whole fruits	2.14	.711	Less Knowledge
Vegetables	2.02	.829	Less Knowledge
Beans	2.12	.640	Less Knowledge
Nuts	2.01	.772	Less Knowledge
Irish potato in jackets	2.12	.656	Less Knowledge
Unpeeled sweet potatoes	1.90	.674	No knowledge
Average Mean	2.06	.724	

The table 12 above summarizes nutritional knowledge on quantity of fibre in food items. It shows that all the mean scores are less than average weighted mean score of 2.5. The mean scores are verbally interpreted as less knowledge which indicates that adults were less knowledgeable about quantity of fibre in various food sources. They are also below the weighted mean to have any impact. The highest mean of 2.16 with a standard deviation of 0.788 is indicative of the fact that adults were less knowledgeable about the quantity of fibre in whole grains as the given food item. It implies that the responses were homogenous, but not closely related since the standard deviation is close to 1.0. The lowest mean score of 1.90 with a standard deviation of 0.674 is verbally

interpreted as not knowledgeable and responses were homogenous, though not closely related. It implies that adults were not knowledgeable about the quantity of fibre contained in unpeeled sweet potato. This finding is in consistence with what Spronk I, Kullen, Burdon and O'Connor (2014) reported that some responded expressed lack of knowledge about dietary fibre.

Quantity of Fibre in Food Portion

Question Six: What is the quantity of fibre in portions of food adults eat?

Table 14: Quantity of Fibre in Food Portion

Quantity of Fibre in Food Portion	Mean	Std. Deviation	Verbal Interpretation
Portion of vegetables eaten per day	2.36	.482	Inadequate
Portion of fruits eaten per day	1.60	.586	Inadequate
Portion of whole grain eaten per day	1.89	.751	Inadequate
Portion of whole nuts eaten per day	1.58	.781	Inadequate
Portion of brown bread eaten per day	1.60	.804	Inadequate
Portion of nsima or porridge with roller meal per day	1.88	.856	Inadequate
Average Mean	1.81	.71	

Table 13 summarizes knowledge about fibre content in portions of food intake. Fibre content in portions of food that adults ate, was inadequate. The highest mean of 2.36 with a standard deviation of 0.482 is verbally interpreted as inadequate. There is homogeneity in responses which indicates that adults were in agreement. This implies that adults ate less amounts of food which contained fibre. Portions of food which adults ate were inadequate to supply required amounts of fibre considering that the weighted the mean scores were below 2.5 which signifies a negative impact. This finding is similar to that by Garcia-Meseguer, Delicado-Soria, and Serrano-Urrea, (2017) who reported low fibre intake among a group of Tunisian students compared to the required standard.

Quality of Fibre

Question Seven: What is the quality of fibre contained in food that adults eat?

Table 15: Quality of Fibre

Quality of Fibre	Mean	Std. Deviation	Verbal Interpretation
Eaten unpeeled sweet potatoes for breakfast	1.72	.726	
Eaten Irish potato in jackets	1.41	.494	
Eaten nsima cooked with roller mealie meal	2.10	.785	
Eaten vingobwe (whole maize grain)	1.67	.711	
Eaten sample with groundnuts	1.95	.821	
Eaten a mixture of fruits with outer covers	1.73	.709	
Eaten vegetables with un sieved pounded groundnuts	1.80	.739	
Drunk tombwa (sweet brewed drink)	1.57	.714	
Taken a smoothie made of fruits and vegetables	1.25	.500	
Eaten a mixture of vegetables	1.77	.737	
Eaten a mixture of fruits	1.59	.712	
Eaten a mixture of whole grains	1.45	.609	
Eaten a mixture of nuts	1.16	.368	
Eaten a mixture of seeds	1.09	.288	
Eaten a mixture of beans	2.06	.789	
Average Mean	1.62	.597	

Table 14 summarizes quality of food containing fibre which adults ate. The results show that food intake in terms of fibre, was of moderate quality. The highest mean of 2.10 with a standard deviation 0.785 indicates that quality of fibre in food intake among adults was moderate. There was homogeneity in their responses, though not closely related since the standard deviation is close the value of 1.0. The lowest mean score of 1.09 with a standard deviation 0.288 shows that adults did not eat a mixture of seeds as a source of fibre and this is verbally interpreted as low quality. The standard deviation of 0.288 implies homogeneity with similarity in the adults' responses towards

intake of seeds. This implies that the main source of fibre among adults was from maize, which is one of the cereals. Maize is used to prepare mealie meal for making nsima and porridge which is the main traditional food in Zambia and other nations in the sub-region. Garcia-Meseguer, Delicado-Soria and Serrano-Urrea (2017) also found out cereal as the major contributor of fibre in food intake among students.

Perception of Fibre

Question Eight: How do adults perceive fibre contained in their food intake?

Table 16: Perception of Fibre

Perception of Fibre	Mean	Std. Deviation	Verbal Interpretation
Fibre is an important part of food	2.09	.793	
Fibre is required in the body	1.90	.644	
Fibre makes food become rough	1.86	.817	
Fibre makes my stomach feel too full and uncomfortable	1.99	.927	
Fibre provides satiety	2.00	.791	
Fibre aids digestion	1.81	.825	
Fibre aids healthy functioning of body	1.85	.796	
Fibre makes food become difficult to digest	1.82	.687	
Fibre causes running stomach	2.26	.760	
Fibre distorts taste of food	2.16	.788	
Average Mean	1.97	.701	

The table 15 summarizes perceptions of fibre in food intake among adults. The highest mean score of 2.26 with a standard deviation of 0.760 shows that adults had a moderate perception of fibre as regards its contribution to causing a running stomach. There was homogeneity in their responses, though adults answered differently. The mean score of 2.16 with standard deviation of .788, also reveals that adults moderately perceived fibre as contributing to poor taste of food. Responses given

are homogenous, though not closely related. This finding suggests that adults' perception of fibre was limited. Adults perceived fibre as a factor in contributing to quality of food which appeals to their senses. The results show that fibre did not appeal to most of the adults. The mean score of 1.90 with a standard deviation of .644, reveals adults disagreed on the requirement of fibre in the body. It also implies that responses were homogenous, though not closely related since the standard deviation is above 0.5. The mean score is verbally interpreted as a wrong perception. They did not have the right perception of fibre and as such they risked disregarding it in their food intake. Adults' perception of fibre in food is attributed to many factors such as nutrition knowledge levels, cultural and social trends and dynamics in food behaviour (Bielemann, Motta, Minten, Horta and Gigante (2015).

Quantity and Quality of Fibre in Food Intake

Question Nine: Is there a relationship between quality and quantity of fibre contained in food intake for adults?

Table 17: Relationship between Quantity and Quality of Fibre in Food Intake

Quantity of Food	Quality of Food							
		Whole grain	Fruits	Irish Potato in Jackets	Unpeeled Sweet Potato	Vegetables	Nuts	Beans
Pearson Correlation		-.109	-.105	.002	-.120	-.241	.136	.306**
Sig (2-tailed)		.278	.300	.980	.235	.016	.176	.002

**Correlation is significant at 0.01 level (2-tailed)

The above table summarizes the association of quantity and quality of fibre in food intake among adults. Correlation between quantity and quality of fibre varied according to food items. Some of the cases indicated positive correlation which was weak because all the Pearson r noted were below .40 while others showed an inverse association.

There was a weak positive correlation between the quantity and quality of beans as indicated by Pearson r – coefficient = 0.306**, p = .002. The two asterisks ** after 0.306 shows that relationship was statistically significant at p < 0.01. The p = .002 is indicative of a significant inverse relationship between quantity and quality of beans used as fibre in food intake among adults. Statistically significant, p = .002 < 0.01 suggests that there is a significant correlation between quantity and quality of fibre from beans included in food intake among adults. In this case, we accept the hypothesis. It concluded that there is a significant relationship between quantity and

quality of beans for fibre included in food intake among adults. The lowest positive relationship between quantity and quality of Irish potatoes is given by Pearson r – coefficient - 0.002, $p = 0.980$. The Pearson $r = 0.002$ implies a very weak relationship between quantity and quality of beans. This relationship is significant at $p = 0.05$. Thus, the $p = 0.980 > 0.05$ indicative of no significant relationship between quantity and quality of beans eaten as fibre in food intake for adults.

Negative relationships existed between quantity and quality of fibre in food intake among adults was recorded in fruits and vegetables. There was no significant relationship between quantity and quality of fruits as indicated by Pearson coefficient $r = -.105$, $p = .300$. Similarly, there was no significant relationship between quantity and quality of vegetables to provide fibre as stated by Pearson r coefficient $r = -.241$, $p = .016$. Correlation was statistically significant at $p = 0.05$. In this case, $p < .016 < 3.00$. P values for fruits and vegetables are $p = .300$ and $p = .016$, respectively, are greater than the p value of 0.05. This also applies to whole grains with a $p = 0.05$. In this case, we fail to reject the hypothesis. It is concluded that there is no significant relationship between quantity and quality of fruits and vegetables used for fibre in food intake among adults.

Discussion

Fibre is one of the important components of food. This study has shown that some adults do not consume enough dietary fibre. Li and Komarek (2017) observed inadequate consumption of fibre and food containing large amounts of it among some people in western countries. Attributed to this situation are many factors which include inadequate nutritional knowledge on quantity and quality of fibre required in diets. It is perceived differently by some people. While some people perceive fibre as part of healthy food, others still think that is detrimental to their health. Dietary patterns determine inclusion or exclusion of fibre in food intake. There are some dietary practices that entail inclusion of food sources rich in fibre while others do not. Those people whose dietary practices traditionally include fibre rich food items, do not see the need for it. However, it is those people who do not eat food rich in fibre that are prone to suffer from adverse conditions that come as a result of inadequate or lack of fibre. This study has revealed that there are some people who lack nutritional knowledge in the use of fibre in their diet. The need for education in nutrition cannot be over emphasized. Because not all the people who attain general education are exposed to nutritional knowledge that can enable them make informed decisions on matters regarding quantity and quality of fibre. Spronk, Kullen, Burdon, and O'Connor, (2014) attest to the fact that it is only people with

more knowledge about food and its components, such as dietary fibre, who are likely to make appropriate decisions about fibre consumption.

This study has revealed that some adults do not have enough knowledge on fibre. They eat food which is not properly balanced. While eating is perceived as a natural activity because of the body compels people to eat, naturally, it does not mean that people know what they should eat for them to be healthy. It is for this reason that deliberate actions should be initiated to educate some of the people on the required food sources which are crucial to the attainment of good health and nutrition. Ljubicic et al (2017) indicate the need to initiate educational programmes meant to sensitise the populace to adhere to required amounts of fibre intake, high-fibre food sources and the systems methods by which fibre can aid put a stop to disease.

It is time that nutrition education was taken seriously in Zambia. This is because it is one of the viable ways through which lives can be saved, not only that, the nation can save a lot of money which is spent on preventable adverse conditions which come as result of poor dietary practices of lack of fibre is one. Fibre included in food intake has many health benefits which people can enjoy given the right opportunity. Constipation, diverticular disease, haemorrhoids, hypertension and diabetes are some of the adverse conditions which can easily be prevented if right education is given. Sudha *et al.* (2011) noted that diets, deficient in DF, lead to a number of diseases such as constipation, hiatus hernia, appendicitis, diabetes, obesity, coronary heart diseases, gallstones, etc. Other studies have shown how dietary fibre can be instrumental in averting development of stroke Zhang *et al.*, 2013) and colorectal cancer (Dahm *et al.*, 2010). Fibre has been known to help in weight loss or prevent weight gain, mainly through satiety or fullness regulation (Mozaffarian *et al.*, 2011;

The change of technology and the wave of new information, have come with advantages and disadvantages. While in some instances, knowledge has not only increased, but it can easily be accessed. Exposure to some types of knowledge has changes people's perceptions of many things of which fibre is no exceptional. Popkin, Adair and Ng (2012) caution about new developments impacting on people's food cultural habits resulting in endangering their health. It is for this reason that people are supposed to be knowledgeable, nutritionally so that they cannot be easily swayed and develop harmful habits. There many different types of food items on the market which attract a lot of people. Some of these food items are not good, nutritionally.

The results showed that adults had a limited perception of use of fibre in their food intake. This is dangerous because it puts the adults at risk of not making maximum use of fibre in their diets.

Adults need to have the right perception of fibre used in their food intake if its full benefit is to be attained. Because adults provide guidance to young ones, enabling them to have the right perception of fibre in their food intake, can have a trickle-down effect. Low perception of health benefits of fibre contained in food is likely to cause some people to make poor food choices that lack adequate fibre. Hołyn´ ska, Kucharska, Sin´ ska Panczyk (2015) explain that lack of knowledge about notable health benefits of dietary fibre can lead to people consume less fibre and make them prone to develop adverse conditions such as diabetes.

Conclusion

Conclusions drawn from the findings of the study were as follows: Despite there being adequate knowledge about fibre and its benefit to health, very little is being known. Some of the adults in this study attested to the fact that they had moderate knowledge while others were completely ignorant. The results indicate that adults were moderately knowledgeable about fibre content in types of food. Fibre content in portions of food that adults ate, was inadequate. Adults ate portions of food which contained an inadequate supply of fibre. Adults were less knowledgeable about quantity of fibre contained in various food sources. The results showed that food intake in terms of fibre, was of moderate quality. This means that adults ate food lacked high quality of fibre. The majority of the adults had a wrong perception of fibre, a situation which put at risk of disregarding it in their food intake. Adults perceived fibre as a factor in contributing to quality of food which appeals to their senses. The results show that fibre did not appeal to most of the adults. Correlation between quantity and quality of fibre varied according to food items. A few cases, beans, for example, indicated positive correlation which was weak because all the Pearson r noted were below .40. Negative relationships existed between quantity and quality of fibre in food intake among adults was recorded in fruits and vegetables.

Recommendations

Ministry of General Education and Ministry of Education, Science and Vocational and Early Education, Ministry of Community Development, Mother and Child, should work in collaboration with Ministry of Health, in particular, National Food and Nutrition Commission, to intensify community nutrition education. Education should start early in schools so that children can be in a position to make informed choices about right types of food to eat. Community nutrition should be intensified to include members so that they can learn about basic nutrition which fosters good health. There is need to fund nutrition education activities so that adverse effects can be reversed and prevented where necessary.

REFERENCES

- [1] Anderson J, Grande F, and Keys, A. (1973) Cholesterol lowering diets: experimental trials and literature reviews. *J Am Diet Assoc.* 62:133–142
- [2] Anita, F.P., and Abraham, P. (1997). *Clinical dietetics and nutrition*. Delhi: Oxford University Press, Calcutta, pp 73–77
- [3] Bielemann, R.M., Motta, J.V., Minten, G.C., Horta, B.L., and Gigante, D.P. (2015). Consumption of ultra-processed foods and their impact on the diet of young adults. *Rev. Saude Publica*, 49, 28.
- [4] Chambers, L., Macrickerd, K., and Yeomans, M. (2015, February). Optimising foods for satiety. *Trends in Food Science & Technology*, 41 (2), 149–160
- [5] Dahm, C. C., Keogh, R. H., Spencer, E. A., Greenwood, D. C., Key, T. J., Fentiman, I. S., Rodwell, S. A. (2010). Dietary fiber and colorectal cancer risk: A nested case-control study using food diaries. *Journal of National Cancer Institute*, 102: 614–626.
- [6] Dhingra, D., Michael, M., Rajput, H., and Patil, R. T. (2012). Dietary fibre in foods: a review *J Food Sci Technol* 49(3):255–266
- [7] Fuller, S., Beck, E., Salman, H., Tapsell, L. (2016). New horizons for the study of dietary fiber and health: A review. *Plant Foods Hum Nutr.*, 71:1–12.
- [8] Garcia-Meseguer, M.J., Delicado-Soria, A., and Serrano-Urrea, R. (2017). Fiber Patterns in Young Adults Living in Different Environments (USA, Spain, and Tunisia).
- [9] *Anthropometric and Lifestyle Characteristics*, 9, 1030. Retrieved from www.mdpi.com/journal/nutrients
- [10] Hill, M.J. (1974). Colon cancer: disease of fibre depletion or dietary excess. *Digestion*, 11:289–306.
- [11] Hendrie, G.A., Coveney, J., Cox, D. (2008). Exploring nutrition knowledge and the demographic variation in knowledge levels in an Australian community sample. *Public Health Nutr*, 11:1365–71. doi:0.1017/ S1368980008003042
- [12] Hołynska A, Kucharska A, Siniska B, Panczyk M (2015). The level of nutrition knowledge versus dietary habits of diabetes patients treated with insulin]. *Pol Merkur Lekarski*, 39:292–6.
- [13] Kolodinsky J, Harvey-Berino JR, Berlin L, Johnson RK, Reynolds TW. (2007). Knowledge of current dietary guidelines and food choice by college students: better eaters have higher knowledge of dietary guidance. *J Am Diet Assoc.*, 107:1409–13.
- [14] Li, O.Y., and Komarek, R.A. (2017). Dietary fibre basics: Health, nutrition, analysis, and applications. *Food Quality and Safety*, 1, 47-59.

- [15] Ljubicic, M., Saric, M.M., Rumbak, I., Baric, C.I., Komes, D. Satalic, Z., Guiné, R. P.F. (2017). Knowledge about dietary fibre and its health benefits: A cross-sectional survey of 2536 residents from across Croatia. *Medical Hypothese*, 105, 23-31.
- [16] Spronk I, Kullen C, Burdon C, O'Connor H. (2014). Relationship between nutrition knowledge and dietary intake. *Brit J Nutr*, 111:1713–26. <http://dx.doi.org/10.1017/S0007114514000087>.
- [17] Mozaffarian, D., Hao, T., Rimm, E. B., Willett, W. C., Hu, F. B. (2011). Changes in diet and lifestyle and long-term weight gain in women and men. *The New England Journal of Medicine*, 364: 2392–2404.
- [18] Neelakantan, N., Whitton, C., Seah, S., Koh, H., Rebello, A.S., Chen, S.L.Y.J., Chan, F.M., Chew, L., and van Dam. R.M. (2016). Development of a Semi-Quantitative Food Frequency Questionnaire to Assess the Dietary Intake of a Multi-Ethnic Urban Asian Population. *Nutrients*, 8, 528
- [19] Omran, A.R. 2005, The epidemiologic transition: A theory of the epidemiology of population change. *Milbank Q.* 83, 731–757.
- [20] Popkin, B.M.; Adair, L.S.; Ng, S.W. (2012). Global nutrition transition and the pandemic of obesity in developing countries. *Nutr. Rev.*, 70, 3–21.
- [21] Roberts K, Marvin K. (2011). *Knowledge and attitudes towards healthy eating and physical activity: what the data tell us*. Oxford: National Obesity Observatory;
- [22] Rolls, B.J, Bell EA, Castellanos VH, Chow M, Pelkman CL, Thompson LU, Josse RG (1999). Energy density but not fat content of foods affected energy intake in lean and obese women. *Am J Clin Nutr* 69(5):863–871
- [23] Sudha, M. L., Rajeswari, G., Venkateswara-Rao, O. (2011). Effect of wheat and oat brans on the dough rheological and quality characteristics of instant vermicelli. *Journal of Texture Studies*, 43: 195–202.
- [24] Trowell H, Burkitt D, Heaton K (1985) Definitions of dietary fibre and fibre-depleted foods and disease. Academic, London, pp 21–30
- [25] Zhang, A., Xu, G., Liu, D., Zhu, W., Fan, X., Liu, X. (2013). Dietary fiber consumption and risk of stroke. *European Journal of Epidemiology*, 28: 119–130.