

Effect of Nutrition Education on Factors Influencing Food Choices in Relation to Prevention of Stomach Cancer among Undergraduates in South-West, Nigeria

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ABSTRACT Nutrition education intervention on factors influencing food choices was examined, aimed at preventing stomach cancer. Participants comprised of 398 undergraduates from 2 universities randomly classified into control and experimental groups. Intervention comprised of 8 weeks' lecture on making healthy food choices (one hour weekly). Data was collected using self-developed and self-administered questionnaires before and after the intervention. Nutrition education significantly affected the perception of factors influencing food choices in the participants ($p < 0.05$). The experimental group recorded a higher mean score of 40.23, $p = 0.00$ and the control group's mean score was 37.58, $p = 0.42$. Socio-economic and media factors significantly influenced the participants' food choices ($p < 0.05$). The experimental group recorded higher mean scores in all variables tested; implying a better understanding of the factors of food choices in relation to stomach cancer. Nutrition education is efficacious in modifying food choices which may protect against stomach cancer.

INTRODUCTION

Cancer is a dreaded and painful disease, characterized by undesirable and uncontrollable proliferation of tissue cells. The cause of cancer is largely unknown but many risk factors are recognized. Cancer is generically used for more than one hundred different diseases, including malignant tumours of different sites, such as breast, cervix, prostate, stomach, colon/rectum, lung and mouth. Other examples include leukemia's, sarcomas, Hodgkin's disease and non-Hodgkin's lymphomas (WHO 1990, 2003, 2007; E-health 2004).

Stomach cancer is one of the common cancers of the alimentary (digestive) tract worldwide (Ferlay et al. 2004). It is a disease in which the normal cells in the stomach tissues become cancerous and proliferate uncontrollably. It is rated

as the fourth most common cancer and the second leading cause of cancer related death worldwide; the first three cancer killers have been classified as lung cancer - 17.8% of all cancer deaths, stomach - 10.4% and liver - 8.8% (Crew and Neugut 2006; WHO 2007).

In Nigeria, there is a dearth of statistics about cancer of the stomach and control measures have to be introduced for its prevention despite the apparently low incidence rates recorded (Oluwatola and Ogunbiyi 2003). Gastric cancer is a major cause of cancer death (Echem 2003). Cancer is a disease that causes great suffering and claims many lives; therefore, the overall commitment of scientists and other professionals involved in disease prevention should be to reduce the rates of cancer and other diseases, so that many people can enjoy quality life with good health until they eventually die in old age.

Diet is known to play a substantial role in the aetiology of many chronic degenerative diseases such as coronary heart disease, atherosclerosis, non-insulin dependent diabetes mellitus, osteoporosis and some cancer types such as bowel, stomach, breast and prostate cancer (American Institute of Cancer Research (AICR) 2007). Nutrition is considered the most controlla-

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ble risk factor affecting long-term health and the role of nutrition in health promotion, disease prevention and treatment of chronic disease is well recognized (Schaller and James 2005). Nutrition knowledge is one of the factors that affect the nutritional habits of individuals, families and communities (Ajala 2006).

Health education provides information on disease prevention and making adequate food choices and has been defined as an act of interference that leads to voluntary behaviour modification that is conducive to health thereby enhancing health (Spruit-Metz 2009). Nutrition education is an integral part of health education and is one of the ways identified to prevent cancer spread, especially diet related cancer amongst which is stomach cancer (Turconi et al. 2008).

Dietary adjustment may not only influence the current health status but may determine whether or not an individual develops diseases such as cancer and other chronic diseases later in life. Nutrition education programmes have greatly improved nutritional knowledge, as well as some dietary behaviours and lifestyle of adolescents, changing students' unhealthy living attitudes and dietary habits (Aranceta et al. 2003; Turconi et al. 2008; Yahia et al. 2009).

Food choices if not carefully made can expose individuals to some preventable dietary factors that have been implicated in most chronic diseases including stomach cancer (Ajala 2006). This suggests a dire need for nutrition education among young adults who have been reported to be more susceptible to indiscriminate food choices (Ajala 2006).

Since many undergraduates are young adults, they also encounter numerous health risks along the path to adulthood, many of which affect quality of life and life expectancy (Saad 2006). Studies have also revealed their vulnerability to poor eating habits ("junks") (Ajala 2006; Saad 2006). The "junks" consumed by most of the young adults contain dense calories which are cancer promoting; this poor eating habits may predispose them to diet related cancers with stomach cancer being a prominent one of such cancers in the group (Popkin 1998; St-Onge et al. 2003; Saad 2006). In a study carried out in Germany, it was also recommended that young people should be the target of nutrition education since the quality of the diet eaten usually improves with age (Thiele et al. 2003). A healthy food choice is dependent on many factors and nutrition education is prominent among such

factors which can enable an individual to make informed choices about food intake (Satia et al. 2004; Akinwusi and Ogundele 2005; Prell et al. 2005).

This study examined the effects of nutrition education on the factors influencing food choices of undergraduates in order to ensure continuous prevention and low incident rate of stomach cancer in south-west, Nigeria.

METHODOLOGY

Research Protocol Approval by Ethics Committee

The research protocol was approved by the Ethics Committee of the Oyo State Ministry of Health Ibadan, Nigeria.

The study design was a quasi-experimental to examine the effects of nutrition education on the perception of the factors influencing food choices so as to promote healthy eating that can be preventive against stomach cancer among undergraduates. The participants were males and females undergraduates aged 16-25 years randomly selected from 2 out of the 3 first generation universities in south-west Nigeria. The age group of the participants was classified into 16-20 years and 21-25 years. The two universities were further randomly placed into experimental and control groups (Obafemi Awolowo University, Ile-Ife as experimental and University of Ibadan as the control group). The faculties in each selected university were stratified into two namely: arts and science. Using simple random sampling with replacement, 50% of faculties in each stratum were selected. Then, 25% of the departments in the selected faculties were also randomly selected. Proportionate sampling procedure was used to select 5% of the students from each selected department; participants in the selected departments were stratified into three groups using their levels of study (100-200; 300-400; 500-600). Employing systematic random sampling technique, 5% of the participants were selected from the strata. Two hundred and fifty-nine (259) participants were selected from the experimental group while one hundred and seventy-seven (177) participants were selected from the control group making a total of four hundred and thirty-six (436) participants from both universities. However, three hundred and ninety-eight participants (91.3%) completed the study (with an attrition rate of 8.7%).

The Nutrition Education Intervention

Focus group discussion (FGD) was carried out before the nutrition education intervention to establish baseline information that indicated areas of attention to be addressed. The focus group discussion was conducted in four sessions in each University as follows: males: 100-300 level; 400-600 level; females: 100-300 level; 400-600 level. Each session comprised of 8-11 participants that were selected using purposive random sampling technique. Each discussion session lasted between 45-60 minutes. All the discussion sessions were recorded and transcribed subsequently.

A semi-structured questionnaire was used to obtain information on the factors influencing the food choices of the participants. The questionnaire contained nineteen (19) items in two sections (demographic data=5 items; factors of food choices=14 items). Pre and post intervention test were carried out using the questionnaire.

The nutrition education lectures on the factors of food choices in relation to stomach cancer were developed. The teaching sessions were for eight weeks and the lectures held one hour weekly. The control group also had the questionnaire administered before and after giving them a placebo treatment on HIV/AIDS stigmatization which also lasted eight weeks.

Statistical Analysis

All data collected were coded and entered into computer for analysis, using statistical package for social sciences (SPSS) programme package version 15. Descriptive statistics were used to describe the demographic data, independent t-test and analysis of covariance (ANCOVA) were used for the variables studied; multiple classification analysis (MCA) was utilized to determine the direction and strength of the intervention in the experimental and control groups. The level of significance was set at $p < 0.05$. The focus group discussion (FGD) was used to strengthen the findings in this study.

RESULTS

Demographic Data of the Participants

Table 1 shows that the total number of participants in the experimental group was 225 which represented 56.5% of the participants, and the number of participants in the control group was

Table 1: Demographic characteristics of the participants

Characteristics	Frequency	Percentage	Total
Experimental	225	56.5	398 (100%)
Control	173	43.5	
<i>Gender</i>			
<i>Male</i>			
Experimental	97	24.4%	203 (51%)
Control	106	26.6%	
<i>Female</i>			
Experimental	128	32.2%	195 (49%)
Control	67	16.8%	
<i>Age range</i>			
<i>16-20 years</i>			
Experimental	71	17.8%	127 (31.9%)
Control	56	14.1%	
<i>21-25 years</i>			
Experimental	154	38.7%	271 (68.1%)
Control	117	29.4%	
<i>Level of Study</i>			
<i>100-200 level</i>			
Experimental	121	30.4%	19 (47.5%)
Control	68	17.1%	
<i>300-400 level</i>			
Experimental	98	24.6%	178 (44.7%)
Control	80	20.1%	
<i>500-600 level</i>			
Experimental	6	1.5%	31 (7.8%)
Control	25	6.3%	

173 which represented 43.5% of the participants. Giving a total of 398 participants (an attrition of 8.7%), gender distribution shows that the total number of male participants was 51.0% and the female participants were 49.0% of the total participants. The age distribution in the two age groups used for the study shows that 127 (56 in the control group and 71 in the experimental group) of the participants were between 16 and 20 years of age (31.9%), while 271 (117 in the control group 154 in the experimental group) of the participants were between 21 and 25 years of age (68.1%). The distribution of the participants by the level of study shows that 189 participants (68 in the control group and 121 in the experimental group) of the total participants were in the group of 100-200 level (47.5%), 178 participants (80 in the control group and 98 in the experimental group) of the total participants were in the group of 300-400 level (44.7%), while 31 participants (25 in the control group and 6 in the experimental group) were in the group of 500-600 level (7.8%).

Table 2 shows the factors influencing food choices among the participants. The overall effect of the factors influencing food choices shows that the experimental group had a mean gain of

Table 2: Descriptive analysis of the factors influencing food choices

Group	N	Pretest mean of factors influencing food choices (socioeconomic, media, peer pressure and convenience of fast food)		Posttest mean of factors influencing food choices (socioeconomic, media, peer pressure and convenience of fast food)		P-value	
		Mean	SD	Mean	SD		Mean difference
Experimental	225	38.18	6.55	40.23	5.06	2.04	0.00
Control	173	37.30	7.49	37.58	5.89	0.28	0.42

2.04 (p=0.00) and the control group had a mean gain of 0.28 (p=0.42) after the intervention.

The effect of nutrition education intervention on the perception of the factors influencing food choices in the participants is shown in Table 3. There was a significant difference (p<0.05) in the perception of the factors influencing food choices after the intervention. The experimental group contributed more to the significant results with a mean score of 40.23 than the Control Group with a mean score of 37.58 respectively. Table 4 shows the multiple classification analysis with R²=0.055.

Table 5 presents the influence of socioeconomic factor, Media influence, peer pressure influence and the convenience of fast food on the food choices of participants. There were significant differences (p<0.05) in two out of the four

factors tested (socio-economic and media influence), while there was no significant difference in peer pressure influence and convenience of fast food after the intervention (p>0.05).

DISCUSSION

Stomach cancer is one of the malignant diet related cancers which can be reduced by making healthy food choices (Westenhofer 2005). Data from this study indicate that nutrition education was able to modulate the perception of the factors that influence the participants' food choices (p= 0.00). The experimental group had a higher mean score than the control group (40.23: 37.58). The multiple classification analysis also shows that the coefficient of determination- R² =0.055 which implies that the intervention con-

Table 3: Overall effect of nutrition education on the factors influencing food choices in the participants

Source of variation	Sum of squares	df	Mean square	F	P-value
Covariates:Pretest offactors influencing food choices	6.457	1	6.457	0.218	0.641
Treatment Groups (experimental and control)	679.735	1	679.735	22.918	0.000
Explained	686.192	2	343.096	11.568	0.000
Residual	11715.235	395	29.656		
Total	12401.427	397	31.238		

Table 4: The direction of the overall effect of the perception of factors influencing food choices in the participants

Grand Mean=39.08

Variable + Category	N	Unadjusted variation	Eta	Adjusted for independent + covariates deviation	Beta
Treatment Groups:					
Experiment group	225	1.15	0.24	1.15	0.23
Control group	173	-1.50		-1.49	
Multiple R ²					0.055
Multiple R					0.235

Multiple Classification Analysis

Table 5: Analysis of each of the factors influencing food choices in the participants after nutrition education

Source of variation	Sum of squares	df	Mean square	F	P-value
<i>(1) Covariates (Pretest Socio-economic Factors)</i>					
Treatment	0.529	1	0.529	0.075	0.782
Explained	38.612	1	38.612	5.497	0.020
Residual	39.140	2	19.570	2.786	0.063
Total	2774.609	395	7.024		
<i>(2) Covariates (Pretest Media Factors)</i>					
Treatment	3.580	1	3.580	1.506	0.220
Explained	15.091	1	15.091	6.349	0.012
Residual	18.671	2	9.336	3.938	0.20
Total	938.876	395	2.377		
<i>(3) Covariates (Pretest Factors of Peer Pressure)</i>					
Treatment	3.066	1	3.066	0.878	0.349
Explained	0.061	1	0.061	0.018	0.895
Residual	3.128	2	1.564	0.448	0.639
Total	1379.669	395	3.493		
<i>(4) Covariates (Pretest Factors of Convenience of Fast Food)</i>					
Treatment	4.566	1	4.566	0.611	0.435
Explained	3.475	1	3.475	0.465	0.496
Residual	8.041	2	4.021	0.538	0.584
Total	2952.230	395	7.474		
Total	2960.271	397	7.457		

tributed 5.5% to the significant difference observed. The focus group discussion carried out earlier revealed that the participants did not put health above the type of choices they made for their food. This observation is common in youths at this stage of development (Ajala 2006; Rodgers and Wendt 2007; Demory-Luce and Motil 2008). This observable difference is very remarkable in behaviour change. This can eventually become of a great magnitude and have meaningful benefits at the population level, given that public health interventions such as this must be interpreted in terms of both their efficacy in producing individual behaviour change and their reach within the population (Sorensen et al. 1999). Greenwald (2005) and Larsen (2009) also corroborated this assertion that small changes in the choices made in the selection of food makes a big difference on the overall balance of nutrients in a meal. These small changes are thus desirable to prevent stomach cancer. The finding in this study has been able to confirm the reports from previous studies that health education (nutrition education) is a veritable tool of behaviour change (Ajala 2006; Oladepo 2002).

Influence of socio-economic factors ($p=0.02$) and media influence ($p=0.01$) were the two factors that the participants were able to control

better after the intervention. They were able to make their choices notwithstanding the effect of these factors. This implies that they have made a positive change concerning these factors influencing their food choices as a result of the nutrition education. This apparently confirms the ability of nutrition education to modulate behaviour change. On the other hand, the other two factors (peer pressure influence and convenience of fast food) appear not to have been well controlled by the participants even after the nutrition education. There was no significant difference in the p-values of these two factors after the intervention; peer pressure influence ($p=0.90$) and convenience of fast food ($p=0.50$).

These two factors (convenience of fast food and peer pressure influence) confirm the reports in previous studies and extended by this that they are key determinants in the choice of food made by youths (Prentice and Jebb 2003; Ajala 2006). The apparent indulgence in fast food by the participants despite the nutrition education may be due to the very early and hectic lecture schedules most of them have therefore not having enough time to prepare what they know to be healthy. Most of the students therefore find fast food attractive, convenient to purchase and consume. Secondly, it was observed that there

were many fast food centres in and around the campuses; the relative abundance and accessibility of fast food on campuses may have a greater influence on the students above health considerations which the students fail to take cognizance of. This finding has a major implication as the youths are not putting health value above other considerations in their choice of food and this calls for more concern since most fast foods are loaded with undesirable calories that are not healthy. The youths who are the future of this nation in all ramifications (economic, scientific, technological, social and political) need to be protected from being indulged in incessant consumption of fast foods as this may predispose them to stomach cancer and many chronic diseases.

It is believed that with repeated nutrition (health) education on the detrimental effects of indiscriminate and consistent consumption of fast food on health, there may be an improvement on how these youths consume fast food in favour of healthier diets. Since peer pressure also plays a significant contribution in the influence of fast food consumption and generally on how the youths make their food choices, repeated interactions with the youth through health talks, counseling and inclusion of nutrition education in general studies (GES) in the universities may be necessary to make them further appreciate the need to eat healthily and not succumb to pressures from others when they know what is right. This may also make them serve as agents of dissemination of this vital knowledge to their families and communities.

CONCLUSION

Put together, these results suggest that the factors influencing food choices have to be considered as an entity to succinctly appreciate the influence of these factors on food choices; as considering the input of a single factor may not necessarily have any significant effect on food choices. Nutrition education remains an efficacious tool in influencing behaviour change such as food choices and consequently affects eating habits which may invariably prevent a rise in stomach cancer.

RECOMMENDATIONS

In view of the outcome of the findings in this study, it is recommended that nutrition educa-

tion should be put in the curriculum of all university students irrespective of their discipline of study so that students can be enlightened on making healthy food choices. Also, concerted efforts should be made by institutions (universities) to make only healthy foods available on campuses and make rules to reduce fast food centres on campuses so that the students will be left with no choice but to choose and eat healthily.

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REFERENCES

- Ajala JA 2006. *Understanding Food and Nutrition*. Ibadan: May Best Publications.
- Akinwusi AT, Ogundele BO 2005. Influence of economy, society and personal beliefs on nutritional habits. *Nig Sch Health*, 17(1): 143-149.
- American Institute for Cancer Research (AICR) 2007. Foods That Fight Cancer. From <http://www.aicr.org/site/pageserver?pagename=dc_food_home2007> (Retrieved December 5, 2007).
- Aranceta J, Pérez-Rodrigo C, Ribas L, Serra-Majem LI 2003. Socio-demographic and lifestyle determinants of food patterns in Spanish children and adolescents: The enKid study. *Euro J Clin Nutr*, 57 (Suppl 1): S40-S44.
- Crew KD, Neugut AI 2006. Epidemiology of cancer. *World Journal of Gastroenterology*, 12(3): 354-362.
- Demory-Luce D, Motil KJ 2007. Adolescent Eating Habits. From <<http://www.UpToDate Adolescent eatinghabits.htm>> (Retrieved January 31, 2008).
- Echem R 2003. Gastric cancer is a major cause of cancer death. *Nig J Med*, 12(4): 177-186.
- Ehealth MD 2004. Who Gets Stomach Cancer? From <www.ehealthMD.com> (Retrieved December 12, 2008).
- Ferlay I, Bray F, Pisani P, Parkin DM 2004. *Globocan 2002: Cancer Incidence, Mortality and Prevalence Worldwide*. International Agency for Research on Cancer. Cancer Bases No. 5 version 2.0. Lyon: France.
- Greenwald P 2005. The future of cancer prevention. *Seminars in Onco Nursing*, 21(4): 296 - 298.
- Larsen J 2009. General Nutrition Questions. Ask the Dietician. From <<http://www.dietician.com/general.html>> (Retrieved May 19, 2009).

- Oladepo O 2002. Public health education. In: ZA Ademuwagun, JA Ajala, EA Oke, OA Moronkola, AS Jegede (Eds.): *Health Education and Health Promotion*. Ibadan: Royal People (Nigeria) Ltd., pp. 114-121.
- Oluwasola AO, Ogunbiyi JO 2003. Gastric cancer: Aetiological, clinicopathological and management patterns in Nigeria. *Nig J Med*, 12(4): 177-186.
- Popkin BM 1998. The nutrition transition and its health implications in lower income countries. *Public Health Nutri*, 1: 5-21.
- Prell HC, Berg MC, Jonsson LM, Lissner L 2005. A school-based intervention to promote dietary change. *Adoles Health*, 36: 529-534.
- Prentice AM, Jebb SA 2003. Fast foods, energy density and obesity: A possible mechanistic link. *Obesity Rev*, 4: 187-194.
- Rodgers E, Wendt C 2005. Factors that Influence Eating Behaviour. BC Health Guide. From <<http://shprint.healthwise.net/webprint/webprintMgr.aspx?c=moh>> (Retrieved January 3, 2007).
- Saad L 2006. Nearly One in Five Teens is Overweight. Gallup News Service. From <H:\Nearly One in Five Is Overweight.mht> (Retrieved April 26, 2009).
- Satia JA, Galanko JA, Siega-Riz AM 2004. Eating at fast food restaurants is associated with dietary intake, demographic, psychosocial and behavioural factors among African Americans in North Carolina. *Public Health Nutri*, 7: 1089-1096.
- Schaller C, James EL 2005 The nutritional knowledge of Australian nurses. *Nurse Educ Today*, 25: 405-412.
- Spruijt-Metz D 2009. Adolescence, Affect and Health. From <<http://books.google.Co.uk/book?id=>> (Retrieved March 3, 2009).
- St-Onge MP, Keller KL, Heymsfield SB 2003. Changes in childhood food consumption patterns: A cause for concern in light of increasing body weights. *Am J Clin Nutri*, 78(6): 1068-1073.
- Thiele S, Mensink GBM, Beitz R 2003. Determinants of diet quality. *Public Health Nutri*, 7(1): 29-37.
- Turconi G, Guarcello M, Maccarini L, Cignoli F, Setti S, Bazzano R, Roggi C 2008. Eating habits and behaviours, physical activity, nutritional and food safety knowledge and beliefs in an adolescent Italian population. *J Am Coll of Nutri*, 27(1): 31-43.
- Westenhoefer J 2005. Age and gender dependent profile of food choice. *Forum Nutri*, 57: 44-51.
- World Health Organization (WHO) 1990. *Diet, Nutrition and the Prevention of Chronic Disease*. Geneva: WHO.
- World Health Organization 2003. Global Cancer Rates Could Increase by 50% to 15 million by 2020. From <<http://www.who.int/mediacentre/news/releases/2003/Pr27/en>> (Retrieved October 3, 2007).
- World Health Organization 2007. WHO/Cancer: Diet and Physical Activity's Impact. From <<http://www.who.int/entity/dietphysicalactivity/en>> (Retrieved December 5, 2008).
- Yahia N, Achkar A, Abdallah A, Rizk S 2008. Eating Habits and Obesity among Lebanese America University Students. From <<http://www.pubmedcentral.nih.gov/redirect3.cgi?and-auth=0X1-wZuwEx-zrqrttsrhfoesrxrlth5qvo0c49n5w8andreftype=extlinkandartid=2584644andarticleid=2584644andiid=161312andissue-id=161312andjid=128andjournal-id=128andfrom=article%7cfront%20matterandto=external%7clink%7curiandrendering-type=normalandandhttp://creativecommons.org/licenses/by/2.0>> (Retrieved January 3, 2009).