OriginalResearchArticle

Addressing Diet-related Non-Communicable Diseases in Ghana: Nutritional Knowledge and Cooking Practices of Fast-food Vendors in Kumasi Metropolis

Abstract:

Introduction:Fast-food vendors play a crucial role in meal preparation and provision for a significant portion of the population. However, little is known about their nutritional knowledge and practices, particularly in relation to diet-related non-communicable diseases (NCDs).Thestudythereforeassessesthenutritionalknowledge and cooking practices of fast-food vendors in the Kumasi Metropolis of Ghana.

MethodsandMaterial: Aquantitativecross-sectionalstudywasconductedinthreesuburbs(Bantama, SuameandTafo)inKumasi,Ghana210fast-foodvendorswererecruitedforinterviewsbasedonchance per their location. A simple probability sampling technique was used to select study sites. Interviews wereconductedwithasemi-structuredquestionnaire.Descriptivestatisticswereusedtoanalyse

continuous variables. Inferential statistics such as chi-square was used to compare the nutrition knowledge scores with the participants' demographic characteristics.

Results: Female respondents accounted for 66.2%. More than 80% of participants have attained pre-tertiary education, with the majority receiving nutrition education at the pre-tertiary level. The study found 49% of the participants had inadequate knowledge in nutrition, while only 6.2% had adequate nutrition knowledge. Participants' knowledge adequacy and inadequacy on diet-related NCDs, was 5.2% vs. 60%. A significant difference ($p=0.009$, $p\leq0.005$) was observed in nutrition knowledge adequacy among participants' gender and level of education respectively. Also, it was noted that all participants reused their oils several times for deep frying.

Conclusions: Majorityofthefast-foodvendorshadinadequateknowledgeinnutritionanddiet-related diseases,andmostofthemtendtoreusefryingoilmanytimes,whichcanincreasetrans-fatlevels.We suggestthattheMetropolitanAssemblycollaborateswithrelevantinstitutionstoorganizenutritionand health seminars and education for all fast-food vendors before certifying their operations.

Keywords: Nutritionknowledge,fastfood,cookingpractices,non-communicablediseases

Key Messages: There has been an obvious change in the lifestyle and food consumption patterns of manyindividualsandhouseholdsinthepastfewyears.Therehasbeenanincreaseinthepatronageand consumption of fast-foods. Fast-foods are relatively cheaper sources of food and readily available however, many research outcomes have shown that fast foods are high in salt, sugar, monosodium glutamate and fats which when taken in excess can predispose an individual to non-communicable diseases such as hypertension, diabetes, cardiovascular diseases cancers etc. To ensure that fast foods arepreparedinmuch healthierway,theacquisitionofknowledgeonnutritionanddietrelated-diseases by fast-food vendors has been shown to be key.

Introduction:

There has been an obvious change in the lifestyle and food consumption patterns of many individuals andhouseholdsinthepastfewyears.[1]Thecommitmenttofoodpreparationathomehasdecreaseddue to the demands of modern life and work giving rise to the patronage and consumption of fast-foods.[2] By definition, fast foods are a wide range of ready-to-eat foods and beverages, which are sold on the streetandinpublicplaces".[3]Fast-foodsarerelativelycheapersourcesoffoodandreadilyavailableto a large number of people.[3]Despite the ease of access to these foods, many research outcomes have shown the negative effect of fast food on health status.[4,5,6]

Research has shown that fast foods contain health-injurious ingredients such as high salt, high sugar, trans-fats, and saturated fats.[7] To avert this situation and ensure that fast foods are prepared in much healthierways,theacquisitionofknowledgeonnutritionanddietrelated-diseasesbyfast-foodvendors has been shown to be key.[8] In promoting health, it is important to consider both the nutritional knowledge and attitude of consumers and fast-food providers.[8]

Reflectingontherisingfoodconsumptionpatternsoutsidehomes,eating-outestablishmentsareplaying an important role in meeting this need. [9,10] Fast foods are widely patronised for their taste, easy availabilityandreasonableprice.[10]Oneveryimportantroleoffast-foodsistheircontributiontowards maintainingthenutritionalstatusofalargesectionofthepopulation.However,theyarelargelyrefined and high in salt, sugar and fats. These ingredients, when in excess, lead to the development of obesity and its related Diet-Related Non-Communicable Diseases (DR- NCDs). [4,5,6]

These DR-NCDs, such as diabetes, cardiovascular diseases, cancers, and hypertension have become global disease burdens increasing morbidity and mortality. [11,12] In recent times, in Africa, several factorshavebeenlinkedtothesurgeofNCDs.Forinstance,highintakeofsodium,saturatedfats, trans fats, fibre-poor diets, and low intake of fruits and vegetables have been associated with the onset of hypertension and diabetes, which havebecome pervasivewithin the population.[13]Accordingto Addo *etal.*,[14]theprevalenceofhypertensioninruralandurbanGhanais19.3%and54.6%,respectively.

Similarly, the 2018 Global Nutrition Report revealed that over 400 million people worldwide were diagnosed with diabetes.[15]

Fast-food vendors have been identified as stakeholders within the food service value chain and are responsible for meal planning and preparation [49,50]. They decide on what goes into the preparation and serving of these meals. It is common practice to resort to spices containing monosodium glutamate (MSG) to enhance food taste. These MSGs have been linked to the increasing prevalence of Nutrition-related NCDs like hypertension. Also, most fast foods have low fibre and are high in oil. The quantities of vegetables used or served are very minimal, and therefore the health-protecting benefits of fibre which are mainly obtained from these vegetables, may not be obtained by the people who patronise fast foods. According to Reichler and Dalton [16] the Institute of Medicine identified insufficient background and training in nutrition and recipe modification among caterers and chefs as key barriers regarding the preparation of healthy foods in eateries. Mortlock *et al.*,[17] noted that numerous authors are in general agreement that a good level of knowledge and the effective practice of such knowledge are essential in ensuring the safe production of food in catering operations.

The knowledge and cooking practices of fast-food providers relating to nutrition and health are important as consumers are increasingly becoming mindful of healthy eating and nutrition. Even though fast-food providers in the food industry play a vital role in making food accessible to the general public, little is known about their knowledge and practices regarding nutrition and nutrition-related diseases. This study, therefore, sought to assess the general nutrition knowledge and practices of fast-food providers in the Kumasi Metropolis of Ghana. The specific objectives were to ascertain the knowledge of fast-food providers on diet-related non-communicable diseases through interviews and to observe and identify the cooking practices of fast-food providers during meal preparation in the Kumasi Metropolitan area.

Subjectsand Methods:

Thestudy employed a cross-sectional design using thequantitativeresearch approach, wherevariables were specific to the objectives and options were given for choices to generate quantitative data.

The study was conducted in three (3) suburbs of the Kumasi Metropolitan Area (KMA) in the Ashanti Region of Ghana, namely, Bantama, Suame and Tafo Sub Metro. The study population were fast food vendors within the Kumasi metropolis.

Sampling:

KumasiMetropolitanAreahas10sub-metros.Thestudyusedsimplerandomsamplingtoselectthree (3)studysitesthroughblind-foldingandballotingofnameswrittenonpiecesoffoldedpaper.

According to the KMA report cited online (http://kma.gov.gh), there were 446 certificated fast-food operators in the three selected sub-metro. The selection of the fast-food vendors to be interviewed was due to convenience and availability.

Samplesize determination:

A minimum acceptable sample size of 210 fast food vendors was determined using the Yamane [18] formula, with a 100% response rate and an estimated population of 446 fast food vendors in Bantama, Suame, and Tafo, within the Kumasi Metropolis at 95% confidence interval and a margin of error of 5%.

Data collection:

An online semi-structured questionnaire, developed using google forms, was used to obtain data from theparticipants.Thequestionnairewasadaptedfromsimilarstudies[19]onnutritionknowledgeandwas modified to suit the objectives of the study.The questionnaire was made up of four sections; socio-demographicdetailsoftheparticipants,nutritionknowledge,diet-relatedNCDsknowledgeandcooking practices.

Inassessingthedietaryknowledgeofrespondents,alistofquestionsonfoodnutrients,basicfunctions of food nutrients, specific food nutrients and the functions and diet-related diseases were asked.

Ethical considerations:

Ethical clearancewas receivedfrom theCommitteeon Human Research, Publication and Ethics ofthe CollegeofHealthSciences,KwameNkrumahUniversityofScienceandTechnology;witha**reference no. CHRPE/AP/730/22.**

Study participants were approached and the purpose of the research was explained. Those who agreed to be part of the study were given informed consent forms to sign and date. Subsequently, these participants were recruited voluntarily. Participants were informed about their right to withdraw from the study at any time, and this would not affect them in any way.Participants were assured of confidentiality and that their identity would not be disclosed. Again, any information given would be used exactly for the purposes of the study and not contrary. Also, the information would be accessible to only the research team and this information would be discarded appropriately after the study.

Analysis:

Statistical Package for Social Sciences version 25 (SPSS IBM Inc Chicago, USA) was used for data analysis.Absolute,relativefrequenciesandchi-square(Fischer'sexacttest)cross-tabulationwereused todeterminethenutritionalknowledgeandthecookingpracticesoftherespondents.Theoutcomesare presented in tables and pie charts.

Results:

Socio-demographiccharacteristicsoftheparticipants

ThesociodemographicinformationoftheparticipantsispresentedinTable1.Atotalof210participants took part in the study. There were 139 (66.2%) females and 71 (33.8%) males in this study. More than half (57.1%) of the participants were between the ages of 21-25 years, while 5% were more than 30 yearsold.Almosthalf(47.1%)oftheparticipantswereNortherners,withaboutathird(31.9%)being

Akans and about a fifth (21.0%) being either Gas or Ewes. More than 80% of the participants had attainedpre-tertiaryeducationastheirhighestlevelofeducation,withonlyabout12%beinggraduates ofatertiaryinstitution.Regardingtheparticipants'maritalstatus,majority(71.4%)weresingle,afourth (23.3%) of them were married, and about 5% were either divorced or separated.

Table1:socio-demographiccharacteristicsofparticipants

	FrequencyN=210	**Percent(%)**
Age		
15-20	21	10.0
21-25	120	57.1
26-30	57	27.1
31+	12	5.7
Sex		
Female	139	66.2
Male	71	33.8
Ethnicity		
Akan	67	31.9
Ewe	17	8.1
Ga	27	12.9
Northerner	99	47.1
LevelofEducation		
MSLC /JHS	50	23.8
SHS	75	35.7
NVTI	60	28.6
Tertiary	25	11.9
Marital Status		
Divorce	2	1.0
Separated	9	4.3
Married	49	23.3
Single	150	71.4

Source:fielddata,(2022)

Participants'sourcesofNutritionknowledge

Figure 1 presents the sources of nutrition knowledge of the participants. Thirty-seven percent of the participants (37%) received general nutrition knowledge either from family and friends or (14%) from the mass media. Seven percent (7%) sourced nutrition knowledge from dieticians. Six percent (6%) of theparticipantsreportedreceivingnutritionknowledgesolelyfromotherhealthpersonnel.Aboutathird (29.0%) of them received nutrition knowledge from more than one source.

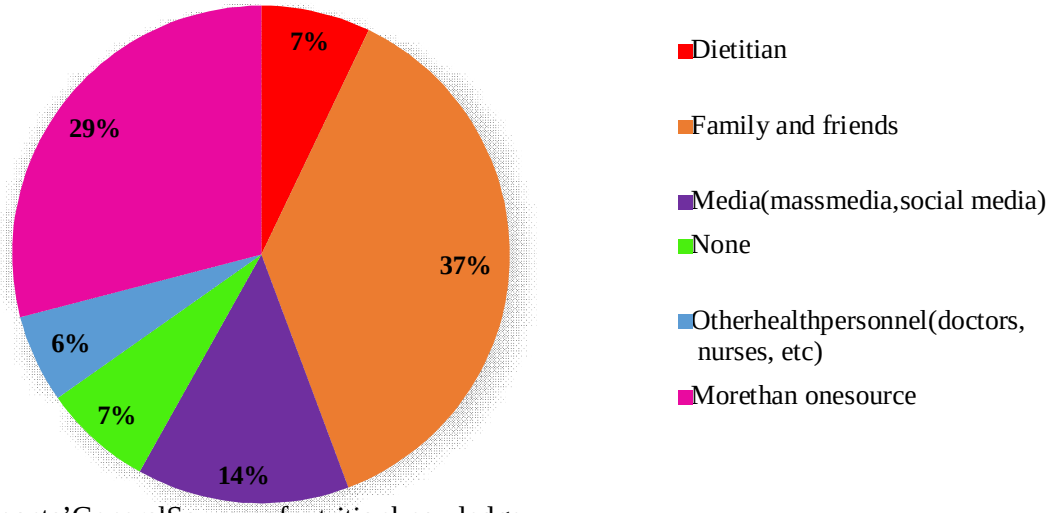

Fig1:Participants'GeneralSourcesofnutritionknowledge
Source: field data, (2022)

Participants'generalnutritionknowledge

Among the 210 fast food vendors, over 90% of them agreed that cereals, yam, plantain, bread and spaghettiaregoodsourcesofcarbohydrates.Majorityoftherespondents(64.8%)didnotagreeorwere not sure whether adequate fibre intake helps with satiety. More than half (51.9%) of the participants erroneously agreed with the statement that fruits and vegetables were not good sources of vitamins, while 11.4% were not sure as they neither agreed nor disagreed with the statement. There was a split whentherespondentswereaskedwhetherchildrenneededmoreproteinthanadults;alittlebelow50% of the participants agreed to the question, while a similar number (43.8%) also disagreed. However, more than 90% of the participants rightfully agreed to the sources of protein. Most (66.7%) of the respondents in this study disagreed that a lack of iron intake could lead toanaemia, as shown in Table 2.

Table2:General nutritionknowledgeoffast-food vendors

Nutrition Knowledge	Strongly disagree n (%)	Disagree n (%)	Neitheragree nor disagree n (%)	Agree n (%)	Strongly agree n (%)
5. Cereals, yam, plantain, bread,andspaghettiaregood sources of carbohydrates.	5(2.4)	0(0.0)	9(4.3)	64(30.5)	132(62.9)
6.Carbohydrateprovidesthe body with energy	5(2.4)	2(1.0)	8(3.8)	66(31.4)	129(61.4)
7. Oats, legumes, and green leafyvegetablesandfruitsare good sources of fibre.	51(24.3)	38(18.1)	17(8.1)	40(19.0)	64(30.5)
8.Adequateintakeoffibre helps increase satiety	52(24.8)	54(25.7)	30(14.3)	25(11.9)	49(23.3)
9.Meat,fish,eggandbeansare good sources of protein	5(2.4)	7(3.3)	6(2.9)	57(27.1)	135(64.3)
10.Proteinhelpspromote growth	5(2.4)	8(3.8)	15(7.1)	49(23.3)	133(63.3)
11.Childrenneedmoreprotein than adults.	44(21.0)	56(26.7)	18(8.6)	34(16.2)	58(27.6)
12. Fruits and vegetables are notgoodsourcesof vitamins.	48(22.9)	29(13.8)	24(11.4)	36(17.1)	73(34.8)
13.Vitaminsprotectthebody against diseases	5(2.4)	33(15.7)	15(7.1)	66(31.4)	91(43.3)
14.Kontomire,alefu,spinach, kidney and egg are good sources of iron	36(17.1)	46(21.9)	24(11.4)	49(23.3)	55(26.2)
15.Lackofironcauses anaemia	47(22.4)	93(44.3)	18(8.6)	21(10.0)	31(14.7)

Source:fielddata,(2022)

Nutritionknowledgeadequacyofthe participants

Table3illustratestheadequacylevelsofthenutritionknowledgeoftheparticipants.Overall,abouthalf (49.0%) of the participants had inadequate knowledge on nutrition, with just 13 (6.2%) participants having adequate nutrition knowledge. A significant difference in knowledge adequacy was found between gender, with more males (26.7%) having moderate knowledge than the females (18.1%) ($p < 0.05$).Slightlymorefemales(4.3%)thanmales(1.9%)hadadequatenutritionknowledge.Again,there was a significant difference($p<0.05$) in the knowledge adequacy among the participants' level of education. Half (50.5%) of the participants aged 21-25 had adequate nutrition knowledge There was alsoasignificantdifferenceobservedamongthedifferentgeneralsourcesofnutritionknowledgeas

wellasamongthedifferenteducationalunitswherenutritioneducationwasreceivedbytheparticipants (p<0.05).

Table3:Adequacylevelofparticipants'nutrition knowledge

	Nutritionknowledge classification				
	Inadequate n (%)	**Moderate n (%)**	**Adequate n (%)**	**Total n (%)**	**p-value**
Gender					
Female	92(43.8)	38(18.1)	9(4.3)	139(66.2)	
Male	11(5.4)	56(26.7)	4(1.9)	71(33.8)	**0.009***
Total	103(49.0)	94(44.8)	13(6.2)	210(100)	
Age					
15-20	10(4.8)	10(4.8)	1(0.5)	21(10.0)	
21-25	78 37.1)	34(16.2)	8(3.8)	120(57.1)	0.086
26-30	12(5.7)	43(20.5)	2(1.0)	57(27.1)	
35+	3(1.4)	7(3.3)	2(1.0)	12(5.7)	
Total	103(49.0)	94(44.8)	13(6.2)	210(100)	
Levelofeducation					
MSLC /JHS	27(12.8)	23(11.0)	0(0.0)	50(23.8)	
NVTI	32(15.2)	27(12.8)	1(0.5)	60(28.6)	
SHS	39(18.6)	33(15.7)	3(1.4)	75(35.7)	**0.000***
Tertiary	5(2.4)	11(5.2)	9(4.3)	25(11.9)	
Total	103(49.0)	94(44.8)	13(6.2)	210(100.0)	
Doyou haveany knowledgeinnutrition?					
No	9(4.3)	4(1.9)	3(1.4)		16 (7.6)
Yes	95(45.2)	90(42.9)	9(4.3)	194(92.4)	0.070
Total	103(49.0)	94(44.8)	13(6.2)	210(100.0)	
Ifyeswhat isthesource the knowledge?					
Dietitian	1(0.5)	12(5.7)	2(1.0)	15(7.1)	
Familyandfriends	28(13.3)	45(21.4)	4(1.9)	77(36.7)	
Media(massmedia,socialmedia)	18(8.6)	9(4.3)	2(1.0)	29(13.8)	0.195
Not applicable	10(4.8)	6(2.9)	0(0.0)	16(7.6)	
Otherhealthpersonnel(doctors, nurses,etc)	7(3.3)	5(2.4)	0(0.0)	12(5.7)	
Morethan one source	39(18.6)	17(8.1)	5(2.3)	61(29.0)	
Total	103(49.0)	94(44.8)	13(6.2)	210(100.0)	
Atwhateducationalleveldid youreceivenutrition education?					
N/A	18(8.6)	9(4.3)	0(0.0)	27(12.9)	
JHS	10(4.8)	25(11.9)	0(0.0)	35(16.7)	
SHS	34(16.2)	28(13.3)	2(1.0)	64(30.5)	**0.014***
NVTI	30(14.3)	20(9.5)	1(0.5)	51(24.3)	
Polytechnic	11(5.2)	10(4.8)	3(1.4)	24(11.4)	
University	0(0.0)	2(1.0)	7(3.3)	9(4.3)	
Total	103(49.0)	94(44.8)	13(6.2)	210(100.0)	

DatawaspresentedinChi-squarewithp≤0.05 Source, field data, (2022)

Participants'knowledgeonnutrition-relatednon-communicablediseases

Majority(56.2%)oftheparticipantsrightfullydisagreedtotheassertionthatfatfromanimalandanimal productsisgoodforthehumanbody.Again,abouthalf(56.2%)oftheparticipantsagreedthatsaturated fats from food is linked to the development of cardiovascular diseases. More than half (60%) of the participants did not agree that fast foods are a source of high fats and oils while 83.9% indicated there was no link or they were not sure of the link between salt and salty foods intake and hypertension. A little over 60% of the respondents were also unaware that canned foods are high in salt. About 71.4% of the participants disagreed that monosodium glutamate was not healthy for the body, with slightly more than half (58.6%) of the participants neither agreeing or not sure about fibre intake preventing diabetes and cardiovascular diseases (Table 4).

Table4:Knowledgeofrespondentsonnon-communicablediseases

Statements	Strongly disagree n (%)	Disagree n (%)	Neither agreenor disagree n (%)	Agree n (%)	Strongly agree n (%)
*About50%of NCDsarediet-related	78(37.1)	72(34.3)	24(11.4)	20(9.5)	20(9.2)
*Monosodium-glutamateisnot healthy for the body	74(35.2)	76(36.2)	21(10.0)	16(7.6)	23(11.0)
*Hypertensionisattributedtohigh intakeof salt	65(31.0)	77(36.7)	34(16.2)	26(12.4)	8(3.8)
*Cannedfoodscontaina lot of sodium (salt).	55(26.2)	70(33.3)	11(5.2)	33(15.7)	41(19.5)
*Ketchupareveryhigh in sugar	64(30.5)	43(20.5)	21(10.0)	44(21.0)	38(18.1)
*Fatsfromanimalandanimal productsis goodforthebody.	64(30.5)	54(25.7)	23(11.0)	40(19.0)	29(13.8)
*Fatsfromplant andplantproducts is goodfor the body.	86(41.0)	29(13.8)	21(10.0)	45(21.4)	29(13.8)
*Foodshighinsaturated fatsandoil arerelatedtocardiovascular diseases.	36(17.1)	24(11.4)	32(15.2)	81(38.6)	37(17.6)
*Fastfoods isasourceofhigh fats andoils.	63(30.0)	56(26.7)	7(3.3)	52(24.8)	32(15.2)
*To prevent HPT and CVDs, the WHOrecommendssaltintakeofless than6 gramsperperson per day.	55(26.2)	53(25.2)	30(14.3)	40(19.0)	32(15.2)
*Fibreintake canpreventdiabetes andcardiovasculardiseases	53(25.2)	39(18.6)	31(14.8)	48(22.9)	39(18.6)

*Datawaspresentedinfrequencyandpercentageterms. Source, field data, (2022)

Diet-relatednon-communicablediseaseknowledgeadequacyofthe participants

Table 5 shows the adequacy levels of participants' knowledge regarding Nutrition-related NCDs. Overall, 11 participants, representing 5.2%, exhibited adequate knowledge about diet-related non-communicable diseases. Also, 139 (66.2%) participants had inadequate knowledge about diet-related NCDs.However,therewerenosignificantdifferencesbetweenthesociodemographiccharacteristicsof the participants and their NCDs knowledge adequacy levels. None of the participants with educational levelofMSLC/JHSandNVTIhadadequateknowledgeaboutdiet-relatednon-communicablediseases. Also, out of the 9 people who received knowledge about diet-related NCDs at the university, majority (5 participants) had adequate knowledge levels.

Table5:Adequacylevelofparticipants'NCD knowledge

	Inadequate n (%)	Moderate n (%)	Adequate n (%)	Total n (%)	p-value
Gender					
Female	91(43.3)	41(19.5)	7(3.3)	139(66.3)	0.285
Male	48(22.9)	19(9.0)	4 (1.9)	71(33.8)	
Total	**139(66.2)**	**60(28.6)**	**11 (5.2)**	**210(100.0)**	
Age					
15-20	17(8.1)	4(1.9)	0(0.0)	21(10.0)	
21-25	83(39.5)	32(15.2)	5(2.4)	120(57.1)	0.053
26-30	33(15.7)	19(9.0)	5(2.4)	57(27.1)	
35+	6(2.9)	5(2.4)	1(0.5)	12(5.7)	
Total	**139(66.2)**	**60(28.6)**	**11(5.2)**	**210(100.0)**	
Levelofeducation					
MSLC /JHS	45(21.4)	14(6.7)	0(0.0)	59(28.1)	
NVTI	31(14.7)	4(1.9)	1(0.5)	36(17.1)	
SHS	54(25.7)	19(9.0)	4(1.9)	77(36.7)	0.702
Tertiary	9(4.2)	23(11.0)	6(2.9)	38(18.1)	
Total	**139 (66.2)**	**60 (28.6)**	**115.2)**	**210 (100.0)**	
Whatisthesourcetheknowledge?					
Dietitian	11(5.2)	0(0.0)	4(1.9)	15(7.1)	
Familyandfriends	57(27.1)	20(9.5)	1(0.5)	78(37.1)	
Media(massmedia,socialmedia)	26(12.4)	1(0.5)	2(1.0)	29(13.8)	0.689
None	10(4.8)	5(2.4)	0(0.0)	15(7.1)	
Otherhealthpersonnel(doctors, nurses,etc)	10(4.8)	1(0.5)	1(0.5)	12(5.7)	
Morethan one source	25(12.0)	33(15.7)	3(1.4)	61(29.0)	
Total	**139(66.2)**	**60(28.6)**	**11(5.2)**	**210(100.0)**	
Atwhateducationalleveldid youreceivenutritioneducation?					
None	14(6.7)	12(4.3)	1(0.5)	27(12.9)	
JHS	25(12.0)	10(4.8)	0(0.0)	35(16.7)	
SHS	44(21.0)	17(8.1)	3(1.4)	64(30.5)	0.448
NVTI	31(14.8)	16(7.6)	4(1.9)	51(24.3)	
Polytechnic	22(10.5)	2(1.0)	0(0.0)	24(11.4)	
University	1(0.5)	3(1.4)	5(2.4)	9(4.3)	
Total	**139(66.2)**	**60(28.6)**	**11(5.2)**	**210 (100.0)**	

DatawaspresentedinChi-squarewithp≤0.05 Source, field data, (2022)

Cookingpracticesoffast-foodvendors

Participantswereaskedabouttheircookingpractices,andtheirresponsesarepresentedinTable6.More than half (68.1%) of the participants reported always or mostly adding stock cubes during meal preparations,while26(12.4%)usestockcubessometimes.Additionally,72.8%oftheparticipants

reported always using canned tomatoes than fresh ones in the preparation of stews and soups.Only about5.7%and15.2%oftheparticipantsreportedalwaysormosttimesservingadequatecutvegetables withmeals.Again,about90%ofrespondentsreportedofalwaysusingthesameoilmanytimesfordeep frying, with 55.2% of the respondents reporting of not often deskinning the chicken before cooking.

Table6:Cookingpracticesoffast-food vendors

Cooking practices	Always n (%)	Mosttimes n (%)	Sometimes n (%)	Notoften n (%)	Never n (%)
*Iaddstockcubes(e.g.,royco, maggie,) in meal preparations.	98(46.7)	45(21.4)	26(12.4)	21(10.0)	20(9.5)
*Iusepolished/refinedricewhen cookingrice dishes.	84(40.0)	39(18.6)	9(4.3)	49(23.3)	29(13.8)
*I use more canned tomatoes than freshtomatoeswhenIampreparing stewsandsoups.	74(35.2)	79(37.6)	15(7.1)	23(11.0)	19(9.0)
*Iusebutter/lard/margarinein food preparationor garnishing.	80(38.1)	62(29.5)	15(7.1)	36(17.1)	17(8.1)
*Iserveadequatecutvegetables (cabbage, lettuce, carrot and cucumber, etc)withmeals.	12(5.7)	32(15.2)	52(24.8)	8440.0)	30(14.3)
*Iuseketchup andsalad cream to servethe food	76(36.2)	52(24.8)	23(11.0)	41(19.5)	18(8.6)
*Iusesaturated fat/oil for cooking.	11(5.2)	20(9.5)	28(13.3)	98(46.7)	53(25.2)
*Ireusethesameoilmanytimes for deep frying.	115(54.8)	74(35.2)	6(2.9)	6(2.9)	9(4.3)
*Ideskinthechickenbefore cooking.	7(3.3)	9(4.3)	6(2.9)	116(55.2)	72(34.3)

*Datawaspresentedinfrequencyandpercentage terms.

Participants'reportonotherusesofoiloverusedfordeepfrying

Figure 2 indicates what the participants do with the same oil they use for several deep frying. After severallyusingthesameoilfordeepfrying,almostalltheparticipants(80%)reportedthattheyprepared "shito" or stew with the overused oil.

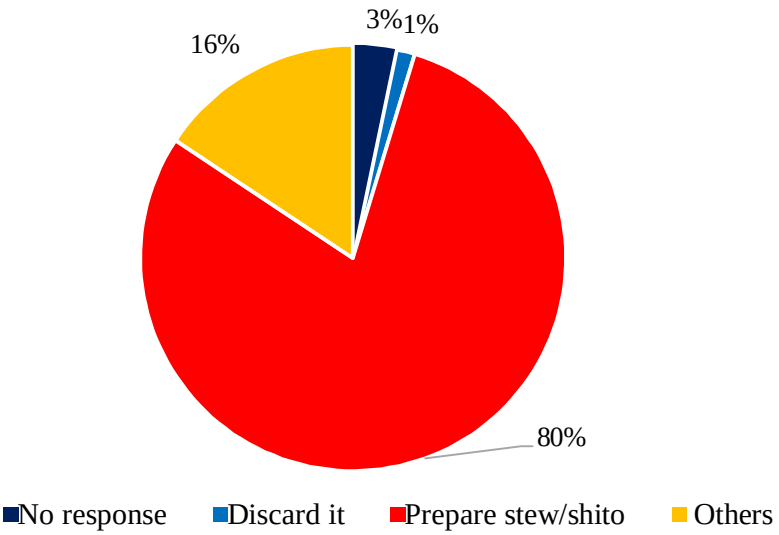

Figure2:Howparticipantsusetheoverusedoilafterdeepfrying.
Source:fielddata,(2022)

Discussion:

The current study assessed the nutrition knowledge and the cooking practices of fast-food vendors withintheKumasiMetropolisofGhana.Therewere139(66.2%)femalesand71(33.8%)malesinthis study, and this is consistent with many studies that had more females in food preparation and vending services,demonstratingthatthelocalfoodserviceindustryistraditionallydominatedbyfemales.[20,21,22] However, some authors reported more males than females in their studies. [2,3,23]. In this study, the assessment of knowledge on nutrients showed that majority of the participants were aware of the good sources of carbohydrates and proteins, and this is similar to the study by Lessa*et al.*,[24]

Even though there has been an established relationship between insufficient iron intake and the developmentofanaemia[25,26,27],mostoftherespondentsinthisstudywereunawareofthelinkbetween iron deficiency and anaemia, as majority (66.7%) disagreed that a lack of iron intake could lead to anaemia.Nutritionknowledgeiskeytopreparinghealthyandnutritiousmealsforconsumption. Inthis study,majorityoftheparticipantshadinadequateknowledgeonnutrition.Eventhoughthereisapaucity ofliteratureintheareaofgeneralnutritionknowledgeoffoodvendorsandhandlers,mostofthestudies onnutritionknowledgeoffoodvendorsandhandlers(focusontheirfoodsafetyknowledge)reported

mixed results. While some studies concurred with the results from this study, [21,24] others reported majority of their participants having adequate nutrition knowledge. [1,2,3,28] There was a significant difference in knowledge adequacy between genders, with more males (26.7%) having moderate knowledge than females (18.1%). A greater number of females (43.8%) than males (5.4%) had inadequate knowledge. Slightly more females (4.3%) than males (1.9%) had adequate nutrition knowledge.Again,therewasasignificantdifferenceintheknowledgeadequacyamongtheparticipants' levelofeducation,andahalf(50.5%)oftheparticipantsaged21-25hadadequatenutritionknowledge. There was also a significant difference observed among the different general sources of nutrition knowledge as well as among the different educational units where nutrition education was received by the participants. Interestingly, for the participants who did not receive nutrition education from any educational institution, none of them had inadequate knowledge in nutrition, while very few of those who received nutrition education in the senior high school (0.5%), polytechnic (0.5%), and university (1%) had inadequate nutrition knowledge.

In this current study, majority of the participants rightfully disagreed with the assertion that fat from animal and animal products is good for the human body. Additionally, about half (56.2%) of the participants agreed that saturated fats from food are linked to the development of cardiovascular diseases; and this link has been established by several studies. [29,30,31]

Interestingly, though fast foods have been known to be a source of high dietary fats and oils and, therefore, could lead to increased caloric intake, [3,7,32] more than half (60%) of the participants disagreed. The participants displayed a relatively low knowledge about salt intake and the link to hypertension, as 83.9% indicated there was no link or they were not sure of the link between salt and saltyfoodsintakeandhypertension.Alittleover60%oftherespondentswerealsounawarethatcanned foodsarehighinsalt.Theyalsodemonstratedtheirlackofknowledgeabouttheeffectsofmonosodium glutamate (MSG) on health, as more than half (71.4%) of them disagreed that monosodium glutamate wasnothealthyforthebody.However,manystudieshaveshownthatfrequentconsumptionofMSGis associated withhypertensionandbeingoverweight,[33,34,35] andthiscontradictsthe responsesgivenby

the respondents. Although several studies have shown the importance of fibre in preventing diabetes and cardiovasculardiseases, [36,37,38,39]slightly morethanhalf(58.6%)oftheparticipants eitherdid not agree or were not sure about that.

The use of stock cubes in meal preparation has been implicated in the rise in hypertension and related diseases.[35,40]Inthisstudy,morethanhalf(68.1%)oftheparticipantsreportedalwaysormostlyadding stock cubes during meal preparations, while 26 (12.4%) used stock cubes sometimes. This was to enhance the taste of the foods to draw more customers since most customers are more interested in the tasteofthefoodthanothercharacteristics,asassertedbyempiricalliterature.[23,24,34,41]Stockcubes,due totheirhighlevelsofsodium,usuallymonosodiumglutamate(MSG),arenotrecommendedforregular consumption,asMSGhassimilareffectsofincreasedbloodpressureassaltdoes.[35]Inaddition,72.8% of participants reported always using canned tomatoes than fresh ones in the preparation of stews and soups.If as high as 68.1% and 72% of fast-food vendors are constantly using MSG and canned tomatoes, respectively, in food preparation, then consumers are being exposed to a high risk of NCDs, and this might have accounted for the surge in NCDs in Ghana in recent years.

In preventing and managing nutrition-related NCDs such as hypertension and diabetes, the WHO has recommendedthedailyconsumptionofatleastfive(5)portionsoffruitsandvegetables.[12]Inthisstudy, about half of the participants reported that they do not usually serve adequate cut vegetables (cabbage, lettuce,carrot and cucumber,etc)withmeals. Thismaybeduetothehighcostoffruitsandvegetables and other health and food safety concerns. Fruits and vegetables are the major sources of protective nutrientsandplayavitalroleinreducingtheriskofmanyNCDshencetheirroleindailydietcannotbe glossedover.Iffastfoodvendorswhohaveinvadedthefoodmarketdonotprovideadequatevegetables to consumers, then consumers are at risk of NCDs and other immunocompromised diseases.

When asked whether they reuse the same oil several times for deep frying, almost all (90%) of the participants always used the oils several times, while just about 4% never reuse the oil. It has been reported that when oils are reused often, they transform into trans-fat, which has been associated with thedevelopmentofCVDs.[42,43,44]Severalstudies,however,pointtothefactthatmostfoodvendors

reuseoils several timesfordeep frying, as also observed fromthis study, and this could be injuriousto health.[44,45]Additionally,almostalltheparticipantsreportedthattheyprepared“shito”orstewwiththe overused oil (Figure 2). This further aggravates the concerns about the intake of trans-fat since these overused oils are likely to have isomerised into trans-fat. Trans-fat has been noted to not only increase the levels of the low-density lipoprotein cholesterol (bad cholesterol) in the body, but also reduce that of the high-density lipoprotein cholesterol (good cholesterol). These are linked to a higher risk of developing stroke, heart disease and type 2 diabetes. [46]

Thisstudyalsoassessedhowchickenispreparedbyfast-foodvendors.Chickenisaveryimportantpart of fast food in Ghana, as many patrons of these foods opt for chicken. Chicken is a good source of protein; however, the skin contains a lot of fat which is unhealthy. [47,48] In this study, 188 (89.5%) participants did not usually deskin the chicken before using it for meal preparation.

Conclusion:

Amajorityofthefast-foodvendorshadinadequateknowledgeinnutrition.Asignificantdifferencewas foundbetweenthenutritionknowledgeadequacylevelsrelativetogenderandtheeducationlevelofthe respondents.

Again, a greater majority of the participants had inadequate knowledge in diet-related non-communicable diseases (Nutrition-related NCDs), with just a few of them demonstrating adequate knowledge levels. However, there was no significant differences between the Nutrition-related NCDs knowledge adequacy levels of the participants and their socio-demographic characteristics.

Regarding their cooking practices, almost all the participants used the same oil several times for deep frying.Justafewdiscardedthisover-usedoil,whilemajorityprepared“shito”orstewwithit.Thefast- food providers used high saturated fats as well as high sodium products in meal preparations for consumers and, in effect, exposed consumers to the risk of the developing Nutrition-related NCDs.

Recommendations

The need for regular nutrition education of fast-food vendors to limit the unhealthy methodsin meal preparationandresorttotheuseofnaturalspicesinplaceofartificialspicessuchasstockcubesisdue. The Ministry of Education should include nutrition and health as a course in catering institutions. This will help train and equip food vendors on how to prepare foods in a healthy manner.

Limitation

A limitation to the study is that the purposive sampling technique employed due to the unorganised nature of the food vendors could be subject to researcher bias.

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