

## **Knowledge and Practice of Local Fried Food Vendors in D/Line, Port Harcourt, Rivers State Regarding the Quality of Oils used for Frying**

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### **Abstract**

*It is a common practice amongst fried food vendors to use the same frying oil repeatedly to save cost which may be harmful to health due to the generation of lipid peroxidation products. This study was designed to examine the level of knowledge and practice of local fried food vendors regarding the quality of oils used for frying. The study population comprised of all 50 fried food vendors in D/line, Port Harcourt Local Government of Rivers State. A purposive sampling technique was adopted to select fifteen respondents for the study. The instrument for data collection was a structured questionnaire which was validated by lecturers from the Department of Food Science and Technology, Rivers State University, Port Harcourt. The findings of the research showed that 66.7% of the respondents used king's refined oil for frying operation with 80% selecting their chosen oil on the basis of durability while 20% were on the basis of price. The level of knowledge and practice of fried food vendors regarding the quality of oil needs to be improved, in key areas such as preference of oil for frying, frequency of use and change of oil, treatments to extend shelf-life of oil and current frying practices. However, they showed good knowledge in other key areas such as storage pattern of re-used oil and practices used during re-use of oil. Therefore, public health officials should go to the field and educate the fried food vendors individually about the perils of using repeatedly heated cooking oil.*

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**Keywords:** Knowledge; practice; frying; oil

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### **Introduction**

The use of oil for frying operations remains one of the most popular methods for the preparation of food around the world as there is an increase in the number of fast food restaurants and fried food vendors. Frying is one of the food processing methods which is fast and convenient for producing products with a specific flavor, colour, taste and crispy surface that is acceptable to many consumers (Tabee *et al.*, 2008). It involves a process of immersing food in hot oil at a high temperature of 150-190°C (Mudawi *et al.*, 2014). Regular consumption of fried foods such as French fries, fried chicken, fried fish, potato chips, bean cake (akara), doughnuts etc has recently increased with economic development and a change in eating habits.

Frying oils, during heating process undergo physical and chemical changes resulting in extensive degradation. Some physical changes include darker oil, smoky smell and an acid taste (Cavus and Sheward, 2014) and these changes finally result in deterioration of the oil, affecting the quality and safety of the fried product (Lioumbas *et al.*, 2013). The frying process

is open to atmospheric oxygen and high temperature. During frying operations; the amount of oil absorbed by the fried foods can affect consumer safety (Cavus and Sheward, 2014). There has been an increase in the consumption of street fried foods in Port Harcourt metropolis. In the commercial sector and amongst fried food vendors, it is a common practice to use the same frying oil repeatedly to save cost. The oil is only discarded when it starts emitting smoke or when the colour becomes too dark. Quality control measures are lacking specifically in relation to the oil types used by fried foods street vendors. Over-used frying oils may contain harmful degradation products, and so, frying oil quality is a very important issue with regards to food safety and consumers' health (Seo *et al.*, 2011). The consumption of repeatedly heated cooking oil is unhealthy due to the generation of lipid peroxidation products which may be harmful to health. A study conducted by Siti *et al.* (2008) suggested that repeated heating gradually diminished the health-protective effects and the formation of atherosclerosis. The quality of oil used for frying is affected by the turnover of cooking oil used for frying, filtering process as well as the use of filtering agents, amongst other. Not much attempt has been made to evaluate knowledge and practice of fried food vendors in Port Harcourt, Rivers State regarding the quality of oils used for frying. It is therefore essential to assess the level of knowledge of fried food vendors in Port Harcourt of the quality of oil used for frying to avoid the use of repeatedly heated cooking oil due to the health hazard of consuming foods fried in them. Hence, this study is aimed at examining the level of knowledge and practice of local fried food vendors in D/line, Port Harcourt, Rivers state regarding the quality of oils used for frying.

## **Materials and Methods**

### **Study Design**

A survey research design was used for this study.

### **Area of study**

The area of study was D/Line, Port Harcourt, Rivers State, Nigeria which comprises of many streets. The streets covered were Agudama, Emekuku, Kaduna, Wogu, and Railway close, all in Port- Harcourt Local Government Area.

### **Population of the Study**

The population of the study comprised of 50 local fried food vendors in the streets of the study areas.

### **Sample and Sampling Techniques**

Purposive sampling technique was used to select twenty respondents who were involved in the frying of "akara" (bean cake). The respondents were selected because they are in position to provide information on the subject matter. However, in course of the study, only fifteen of the respondents were accessible as no respondent involved in the frying of "akara" (bean cake) was seen on some of the streets. The sample size for the study therefore consisted of 15 respondents.

### **Instrument for data collection**

The instrument for data collection was a structured questionnaire validated by lecturers from the Department of Food Science and Technology, Rivers State University, Port Harcourt. The questionnaires were administered face to face to the local fried food vendors to identify the qualitative and interfering factors on the quality oil used in frying. The questionnaire presented questions as preference of oil for frying, frequency of use and change of oil, treatments to

extend shelf-life of oil, current frying practices, storage pattern of re-used oil and practices used during re-use of oil.

### Method of data Analysis

The data collected were analyzed using the statistical package for social sciences (SPSS) version 20.0. Data analysis was done using mean and percentages. All the question items were analyzed accordingly in both parts of the questionnaire from the first number to the last number. Through this way, the research question posited for the study were taken into account and answered accordingly. The data analysis was arranged in form of tables and bar charts in order to device meaning from the item easily.

### Results

#### Socio-economic characteristics of respondents

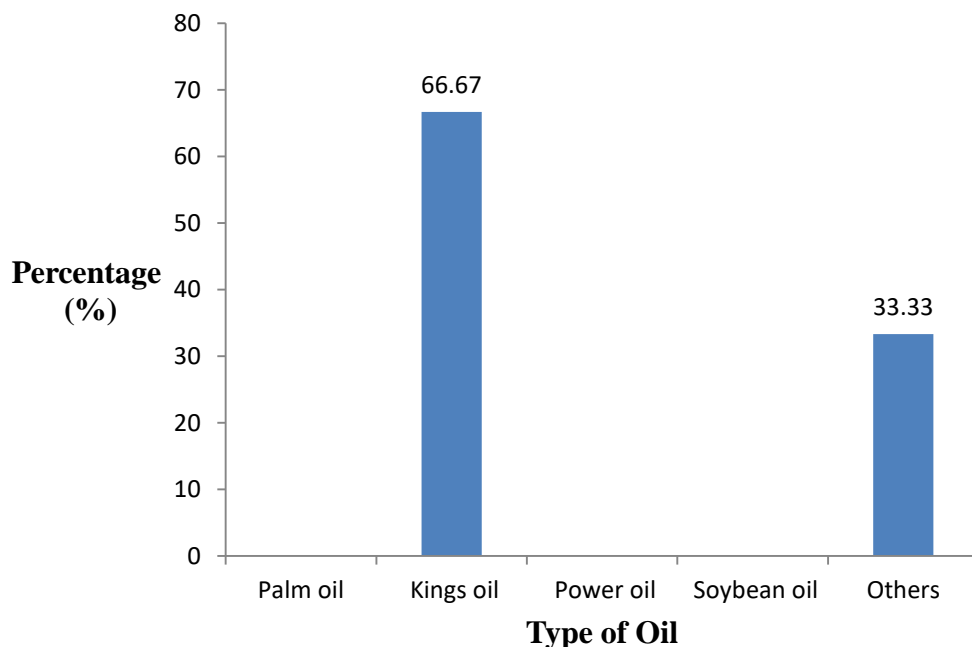
Table 1 shows the socio-demographic characteristics of the respondents. A total of fifteen (15) respondents were used for this study. Out of this, 15 (100%) were females and none was male. About 8 (53.33%) of the respondents were between the ages of 30-39 while 7 (46.67%) were between ages 40-49. None were below age 29 and above 50. About 5 (33.33%) of the respondents do not have any formal education, 6 (40%) had primary education, 4 (26.67%) had secondary level education while none had tertiary level education. About 8 (53.33%) of the respondents were married, 3 (20%) were single, 4 (26.67%) were widowed while none were divorced.

**Table 1: Socio-demographic characteristics of the respondents**

	Frequency	Percentage (%)
<b>Sex</b>		
Male	0	0
Female	15	100
<b>Total</b>	<b>15</b>	<b>100</b>
<b>Age</b>		
>19	0	0
20-29	0	0
30-39	8	53.33
40-49	7	46.67
>50	0	0
<b>Total</b>	<b>15</b>	<b>100</b>
<b>Educational attainment</b>		
None	5	33.33
Primary	6	40.00
Secondary	4	26.67
Tertiary	0	0
<b>Total</b>	<b>15</b>	<b>100</b>
<b>Marital status</b>		
Married	8	53.33
Single	3	20
Widowed	4	26.67
Divorced	0	0
<b>Total</b>	<b>15</b>	<b>100</b>

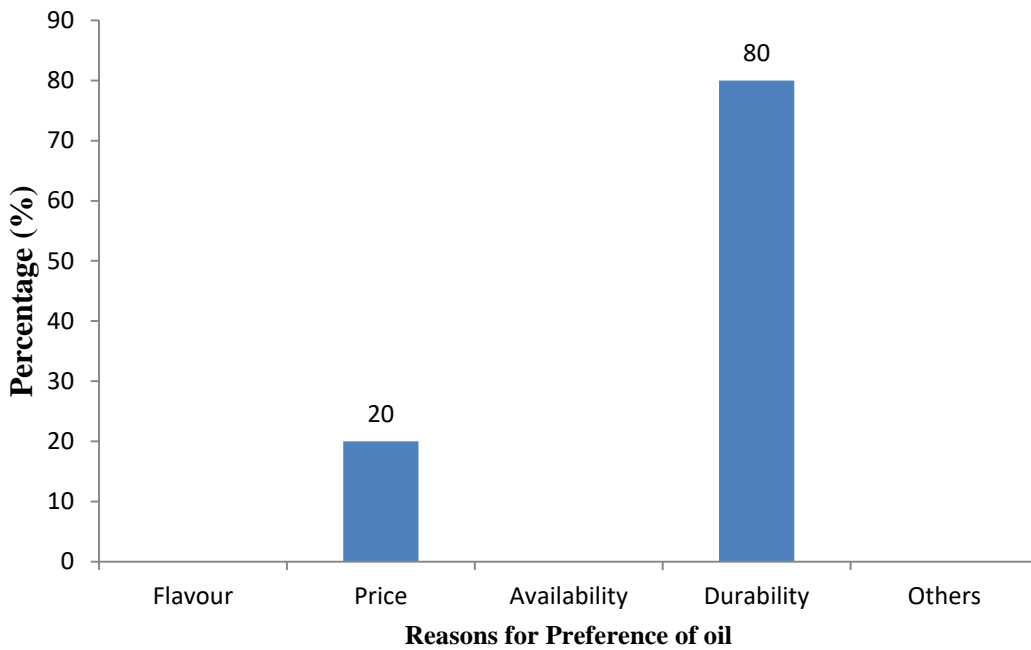
**Research Question 1:** What kind of oil do you use for frying and what's the reason for selection?

Fig 4.1 shows the results on the type of frying oil used by the fried food vendors. The result shows that 10 (66.67%) of the respondents use kings vegetable oil for frying while 5(33.33%) use other sources of vegetable oils.



**Fig 1: Type of oil used by the fried food vendor**

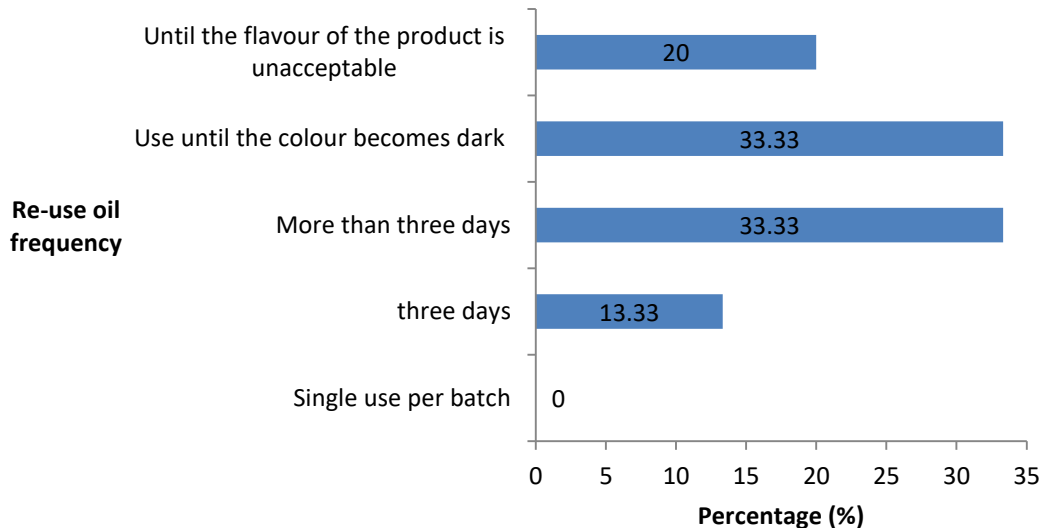
Fig 2 also presents the results on the reason why the respondents prefer their chosen oil. The results show that the majority of the respondents (80%) prefer the chosen oil because of durability while 20% prefer it based on the price. However, none of the respondents selected their oils based on the flavour and availability.



**Fig 2: Reasons of preference of selected oil by fried food vendors**

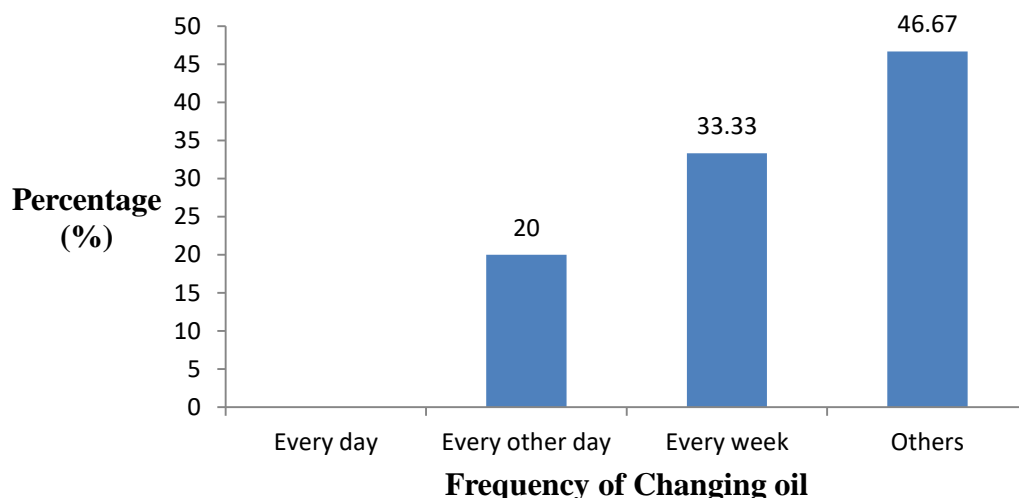
**Research Question 2: What is the frequency of use and change of your oil?**

Fig 3 shows the frequency at which the respondents re-use their oil. The results showed that 2 (13.33%) use their frying oils for three days, 5 (33.33%) use it for more than three days, 5 (33.33%) also use it until the color becomes dark while 3 (30%) use the oil until the flavor of the product is unacceptable. None of the respondents use their oils on single use per batch.



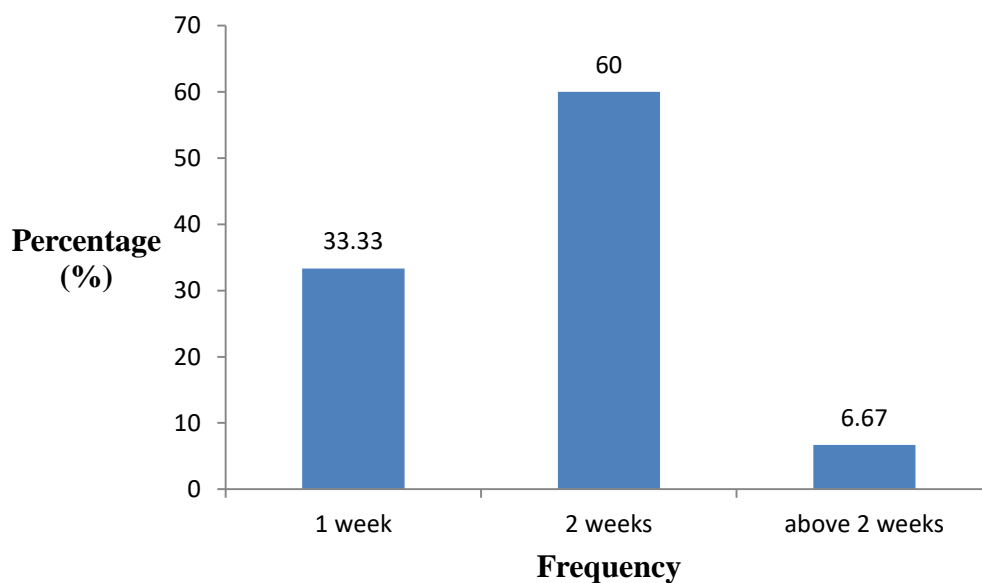
**Fig 3: Frequency of re-use of oil**

Fig 4 shows the results on the frequency at which the respondents change their oil. The results show that 3 (20%) change their oil every other day while 5 (33.33%) change theirs every week. However, majority of the respondents 7 (46.67%) change their oils above a week.



**Fig 4: Frequency of changing of oil**

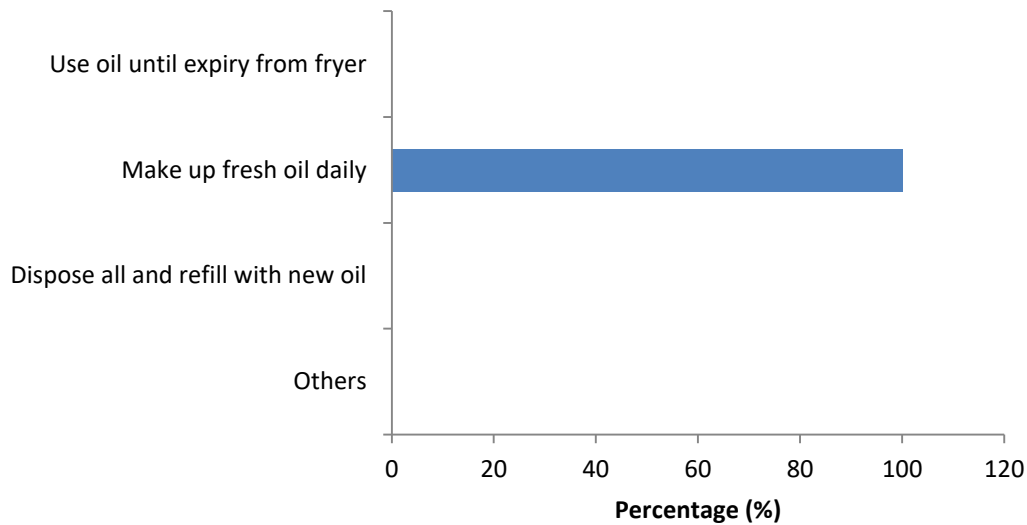
Fig 5 shows the results of frequency at which the respondents use their oils before it becomes dark. About 9 (60%) of the respondents use their oil 2 weeks before it gets dark, 5 (33.33%) for 1 week while only 1 (6.67%) of the respondents use the oil above 1 week.



**Fig 5: Frequency of use of oil before it becomes dark**

**Research Question 3: How do you utilize the remaining oil next day?**

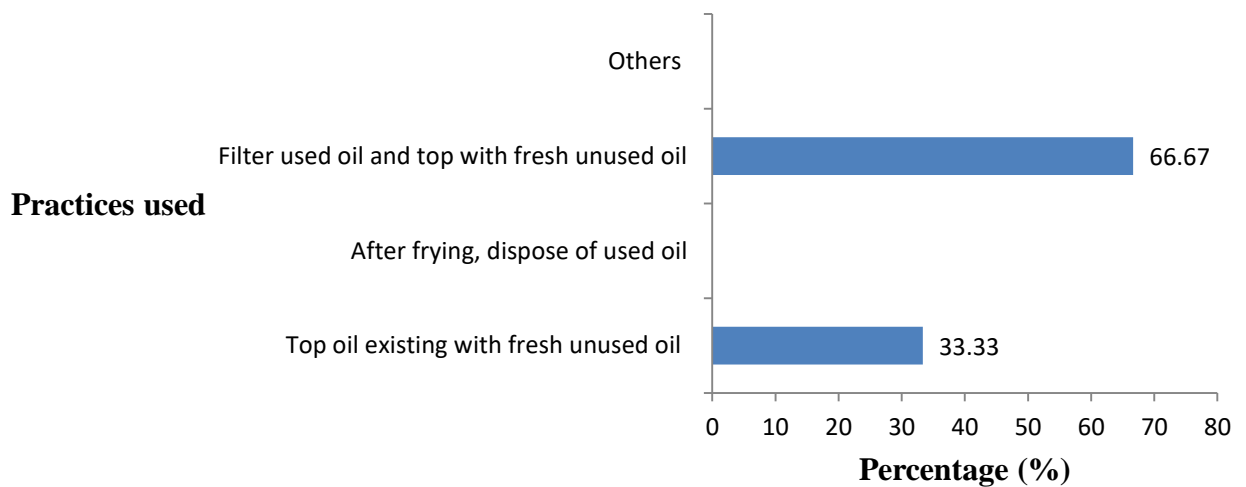
Fig 6 shows the utilization pattern of the remaining oil the next day. All the respondents make up the remaining oil with fresh oil daily before frying. None of the respondents dispose oil and refill with new oil and as well use oil until expiring from the fryer.



**Fig 6: Utilization of oil next day after the end of a day**

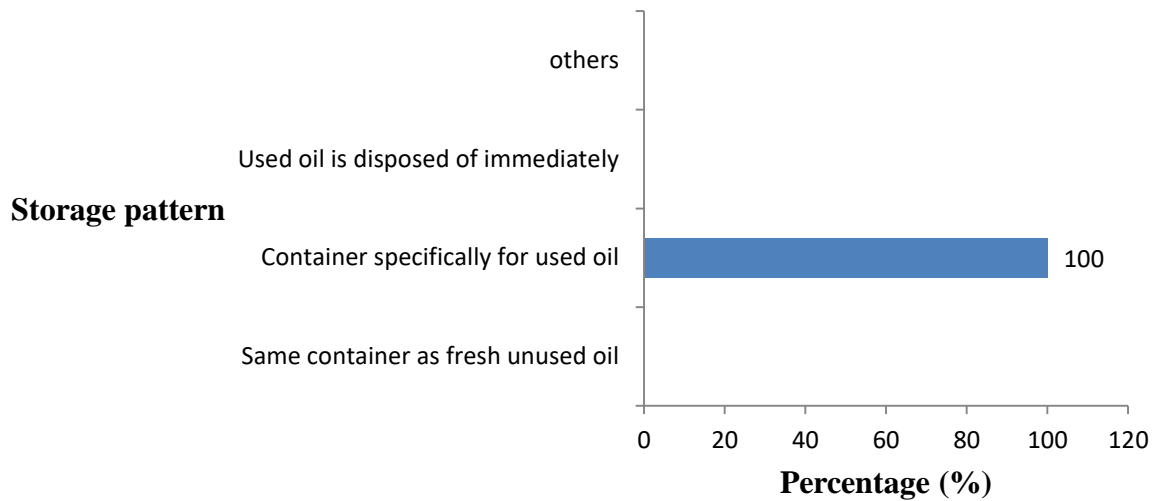
**Research Question 4: What are the practices you use during re-use and storage of your oils?**

Fig 7 shows the results of the practices used during re-use of oil by the respondents. The results show that 10(66.67%) of the respondents filter their used oil and top up with fresh unused oil while 5 (33.33%) top up existing used oil with fresh unused oil.



**Fig 7: Practices used during re-use of oil**

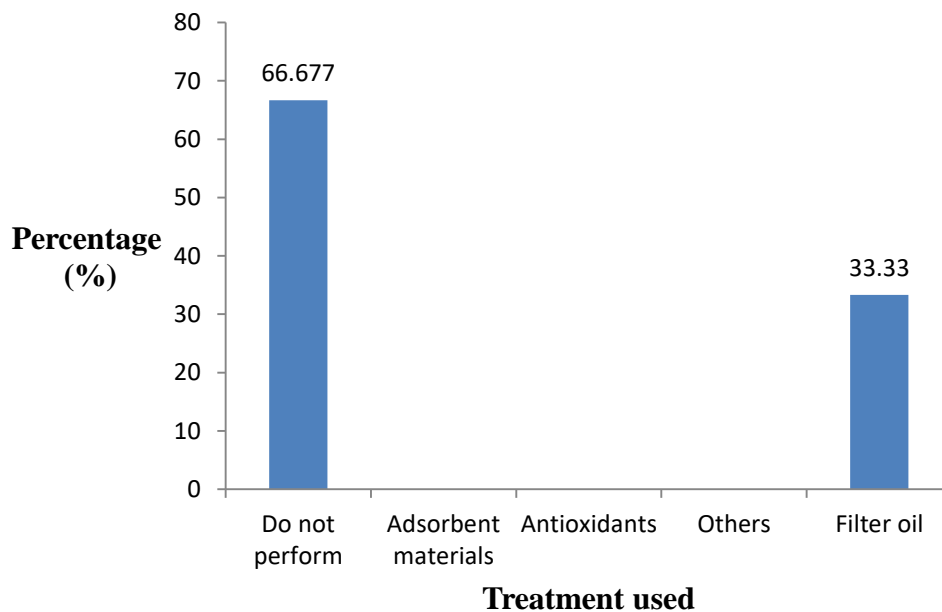
Fig 4.8 shows the results of the storage pattern of re-used of oil by the respondents. The results show that all the respondents (100%) store their re-used oil in a container specifically for used oil.



**Fig 8: Storage pattern of re-used of oil**

**Research Question 5: What are the treatments you perform to extend the usage life of your frying oil?**

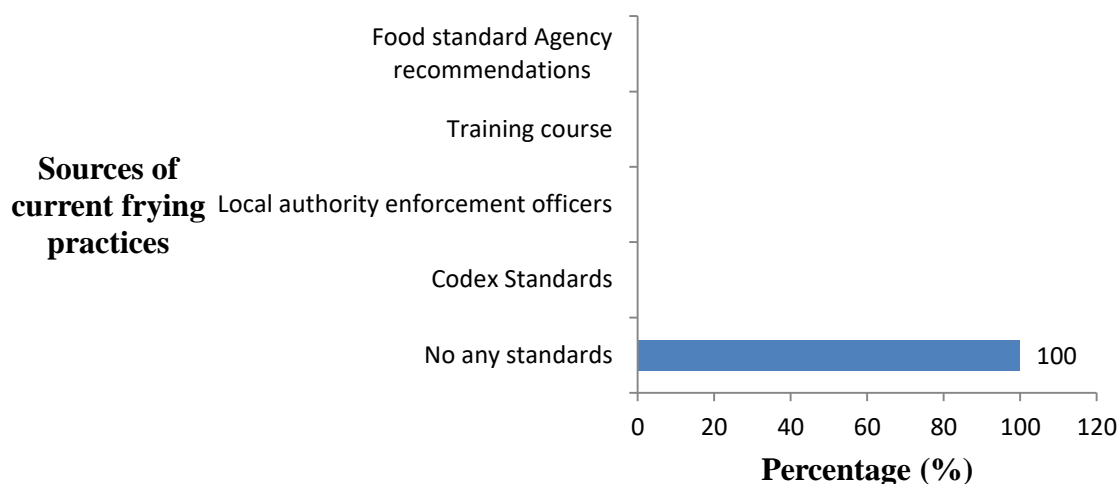
Fig 9 shows the results of the treatments used by respondents in order to extend the usage life of frying oils. The results show that 10 (66.67%) of the respondents do not perform any treatment while 5 (33.33%) filtering their oil. None of the respondents add antioxidants or adsorbents to the oils.



**Fig 9: Treatments used to extend the usage life of frying oils**

Fig 10 shows the results of the sources of information about current frying practices used by respondents. The result shows that all the respondents do not have any knowledge about the current frying practices and as a result do not use any standards.





**Fig 10: Sources of information about current frying practices**

### Discussion of Findings

The findings of the study showed that a minority of study participants (33.33%) used oil from other sources such as the local oils, which may be as a result of its low price, however, surprising to find was that there were no fried food vendor using other types of oil such as Palm oil and power oil, soya- bean. This study is in accordance with the findings of Azman *et al.* (2011) that soy and corn oil were the least used oil by food outlets in Kuala Lumpur, Malaysia due to the fact that these oils were more expensive. The survey also showed that a high proportion of the respondents cited long shelf life as being an important factor in their choice of oil. They stated that they were of the opinion that king's refined vegetable oil had longer storage life than the other alternatives available to them. The respondents lack knowledge about the healthy attributes of the vegetable oils. For a minority of respondents, the prime selection criteria was price, and some due to specific culinary requirements. There was poor knowledge of the actual health aspect of the use of various oils. Results from other research (McSavage and Trevisan, 2001; GSFs, 2008) showed that there are many types of oil which are actually healthy and of quality. Oils such as olive and soy bean oils for example are unique frying oil having low saturated fatty acids and many nutritional benefits which can also be used for frying purposes but very expensive for commercial purposes.

The result from this study also indicates that the respondents lack a set frequency for re-use of oil. There is a need to improve their knowledge on frequency of oil re-use. When frying oil is used repeatedly, it becomes toxic for human consumption (Soringuer *et al.*, 2003). It therefore, recommends public health officials should go to the field and educate the fried food vendors individually about the deleterious effect of repeated heated cooking oil. These measures would address the prevalent lack of knowledge amongst fried food vendors as regards the dangers of using repeatedly heated cooking oil.

The findings also revealed that majority of the respondents (46.67%) change their oils after a week which is bad practice that renders the oil susceptible to thermal oxidation and degradation. This finding corresponds with a previous study by Azman *et al.* (2011) who stated that food handlers (50%) change their oil after they had used it twice or even up to the four times. This finding corresponds to the fact that some of the respondents lack prior knowledge regarding the health negative implications of using repeatedly heated oil. The level of awareness amongst these fried food vendors could be enhanced by educating them on the

accurate frequency of changing their frying oils. Awareness on this issue is important because it had been shown that degradation due to the re-use of vegetable oils is a risk factor for onset of in humans hypertension (Soriguer *et al.*, 2003).

The findings of this study showed that 60% of the respondents use their oil for 2 weeks before it gets dark, 33.33% for 1 week while only 6.67% of the respondents use the oil above 1 week. This corresponds with the reports of Morley-John *et al.* (2002) that respondents changed their oil at least once a week and many of the respondents relied on late signs of degradation (oil colour and smoking) in their decision to change the oil which is a bad practice. Frying oils are often discarded when the colour turns dark yet it does not indicate rapid oxidation and should not be used as a guide for oil quality (Tang, 2015). This response given by the fried food vendors also emphasizes the prevalent lack of knowledge amongst the fried food vendors regarding the danger of prolonged heating of vegetable oil. Therefore, apart from vigorous education via the mass media which might not even reach the uneducated fried food vendors, health officials and personnel should go to the field and educate them about this issue individually as it is critical to food safety and health of our nation. The replenishment of used oil with the fresh oil was a common practice amongst the fried food vendors surveyed. This is a good practice as the fresh oil added between the frying processes will make up for the loss due to uptake in frying. This is consistent with another study done in India by Gupta *et al.* (2015). This is also to make up for the amount of oil absorbed by the fried food without having to completely change the oil which would have both implications for cost and time (Araujo, 2008). This may transfer free radicals into the new batch which may cause illness in consumers. The respondents also made an effort to maintain the quality of oil used for frying by performing filtration to remove food particles or foreign materials in the oil. Filtration enhances the oil life by removing crumbs and other particulate matter (Blumenthal and Stier, 1991). CAC (2011) have recommended that on completion of the frying process, the oil should be filtered in order to remove food particles and crumbs completely, because they accelerate oil deterioration. The findings of this study also showed that the respondents showed good levels of knowledge regarding storage of re-used oil. This therefore indicates that the level of knowledge of respondents regarding storage of re-used oil is high. This result is also in agreement with that of Cavus and Sheward (2014) who reported that all the respondents (100%) stored their oil in a container specifically for used oil. In terms of treatment performed by the fried food vendors to extend the shelf-life of their oils, the respondents indicating lack of awareness on the use of antioxidant and adsorbent materials while 33.33% indicated having knowledge on filtering aids. Filter aids, antioxidants and adsorbent have been reported to extend the life of the oil (Blumenthal and Steir, 1991). The use of natural antioxidants in cooking oil as adsorbents can make the oil safe by retarding the formation of oil deterioration products (Jaswir *et al.*, 2000).

The findings of the study also showed that all the respondents do not have any knowledge about current frying practices and as a result do not use any standards. This could be due to the fact that most of the fried food vendors surveyed were uneducated and as such lacked knowledge of these frying practices. This reflects a negative attitude on the part of the fried food vendors with regards to frying practices since they perceived that as long as the colour of the oil looks acceptable, it is alright to use the oil repeatedly and continuously without following any safety practice which is of course, a very bad practice. Ideally, standardized frying practices should be recommended and adhered to by all fried food vendors. This study is in agreement with the study of Morley-John *et al.*, (2002) which showed that only 8% of independent food outlets operators in New Zealand had formal training in frying practices compared with 93% of chain food operators. This therefore calls for training and certification in food and hygiene training,

health and safety and HACCP training. By ensuring every fried food vendor makes use of guidelines could potentially improve the health of the general public.

### Conclusion

The level of knowledge of the quality of oil used for frying by fried food vendors in Port Harcourt, Rivers State needs to be improved. The findings of the research showed that the respondents lack knowledge regarding the re-use of cooking oil during frying processes. They however showed good levels of knowledge regarding storage of re-used oil and filtering of cooking oils after frying operations. This study has therefore provided a baseline data of current takeaway practices that can be compared with future monitoring surveys in response to interventions and training programs.

### Recommendations

Based on the findings of this study, the following recommendations were made;

1. The respondents from this study need to discard their oil after a work day to ensure its quality and hence, protect the health of consumer and also maintain the quality of fried foods.
2. Education of the respondents on frying safety practices are also needed in these areas.
3. Voluntary training on the proper techniques of frying food should be given to the vendors in government funded vocational schools that provide catering courses.

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