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Research Article

Evaluating Fried Food Vendors' Knowledge and Practices in Harar City, Ethiopia, Regarding the Quality of Frying Oils

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Abstract

Fried food vendors frequently use the same frying oil to save money, which can harm health due to the formation of lipid peroxidation products. This study aimed to determine the level of knowledge and practice of fried food vendors about the quality of frying oils. The findings of the research showed that 100% of the respondents used palm oil for frying operation, 56.7% used their frying oil 10-20 times, 25% used it 5-10 times, 18.3% used using 2-4 times, 94.23% the respondent was using a mix of fried oil with new oil without a filter for frying purposes. The level of awareness and practice of fried food vendors regarding oil quality needs to be improved. As a result, public health officials should go out into the field and directly teach fried food vendors about the dangers of repeated heating oil.

Keywords: Frying; Food Vendors; Oil Type; Reuse Oil

Introduction

Street-market or street food is food and beverage prepared and sold by vendors in the street and other public areas for immediate consumption or sale without further processing or preparation [1]. Types of vending structures include a variety of push carts, roadside stalls, head-loaded hawkers, and other setups, depending on the owner's ingenuity, the resources available, the kinds of food offered, and, therefore, the availability of other services.

Street food vendors are prevalent in developing and industrialized countries, with significant expansion in developing countries [2]. Street vended foods became increasingly important in most African countries. Street foods play a crucial socio-economic role in African economies regarding employment potential. Although street food vendors come from diverse backgrounds, the bulk is female heads of households [3]. In Ethiopia, as in other developing countries, street food sales are one way of producing revenue, and women play a dominant role in this field. Street food has thrived within the major cities of Ethiopia over the past few years. Many people are involved in the street food business [4]. It is becoming common to perceive street vendors near schools, bus stations, and other places with many people [5].

Frying is one of the earliest forms of food production. The popularity is related to the simplicity and pace of food processing and sensory characteristics, such as distinctive flavor and aroma [6]. It is a cheap and quick method of simultaneous heat and mass transfer that changes sensory and nutritional characteristics due to dynamic interactions between food and oil [7]. The simultaneous heat and mass transfer of oil, food, and air during the deep-fat frying result in a perfect and remarkable fried food consistency. However, the consistency of raw materials, food processing, and storage practices most impact street food's health. Fried food vendors also frequently use the same frying oil to save money, which can harm health due to the formation of lipid peroxidation products [8]. This study aimed to determine the level of knowledge and practice of fried food vendors about the quality of frying oils.

Materials and Methods

Survey Study

The study was conducted to gather information from street food vendors regarding their knowledge level regarding the quality and safety issues associated with frying oil. The data collection tool used in this study was a structured questionnaire, interview, and observations.

Questions were developed, and the researcher interviewed the food vendors and hired enumerators. The questionnaire was arranged into three parts covering personal and demographic data, deep fat frying practice, and handling practice of used oil by vendors. Additional data were collected from personal observations and interviews, including observations on the color of frying oil being used, foam in the oil, and the hygienic condition of the working area.

Location and sample size

The study encompassed four significant markets in Harar City. The reason for selecting these four areas was due to a high number of street food vendors and a large number of customers. Twelve street vendors were selected by using a purposive (nonprobability) sampling method from the total of 104 vendors (25 at Arategna,47 at Shewaber,20 at Megala Gudo, and 12 at Amestegna Gebeya) it was conducted on Saturdays because it is market day, on which most street food vendors come out for business. After determining the optimal sample size of vendors, the sample from four market areas was obtained by calculating the proportion of the number of vendors in each market area is based on the following formula.

$$n_1 = \frac{N_1 \times n}{N}$$

- N= is the total vendors in all sample market area
- N_1= is the total vendors in a single market area
- n= sample size
- n_1= is the sample size for market area N_1

Target market area	Total vendors	Sample proportion	No. of samples
Arategna	25	2.9	3
Shewaber	47	5.45	6
Megala gudo	20	2.3	2
Amestegnna gebeya	12	1.3	1
Total	104	11.95	12

Table 1: Procedure for Selection of Vendors.

Source: (Zersh, 2015).

Statistical analysis

Data obtained from the survey were analyzed using the statistical package for social sciences SPSS version 25.0 and Microsoft Excel; Data analysis was done using mean and percentages. All the question items were analyzed accordingly in parts of the questionnaire from the first number to the last number. In this way, the research question posited for the study was considered and answered accordingly.

Results and Discussions

Demographic data of street fried food vendors

As indicated in Table 2, respondents from Shewa Ber, Arategna, Megalagudo, and Amestegna Gebeya participated with percentage proportions of 45.2, 24.0, 19.2, and 11.5, respectively. The areas mentioned above are the primary locations of street fried food vendors in Harar city, with 47 street fried food vendors in Shewaber alone, the greatest in number because it is a huge marketplace with a significant number of fried food consumers.

Similarly, the respondents were a combination of different age groups, including 21 to 30, 31 to 40, and under 20 years old, with percentage proportions of 51.9, 21.2, and 26.9, respectively. Indicates that most responders are young and rely on this work for a living. Furthermore, according to the survey, 89.4 percent of the respondents were female, while the remaining 10.6 percent were male. Indicates that cooking is associated with women in our culture compared to men.

Also, the vendors' marital status comprised 33.7% married, 49.0% single, 14.4% divorced, and 2.9% widowed. It shows that the market can entertain anyone who wants to compete. The survey table has also shown the educational status of the respondents, the respondents' knowledge, and education level accordingly, 47.1% completed secondary level education, 21.2% attained primary education, 14.4% completed technical and vocational education and training (TVET) and the rest 17.3% were illiterate. From this, we can imply that those vendors can be thought and understand oil quality deterioration.

Variable	Population	Percentage%
Location		
Arategna	25	24.0
Shewaber	47	45.2
Megala gudo	20	19.2
Amestegna	12	11.5
Total	104	100
Sex		
Female	93	89.4
Male	11	10.6
Total	104	100
Age		
<20	28	26.9
21-30	54	51.9
31-40	22	21.2
Total	104	100
Education level		
Uneducated	18	17.3

Primary	22	21.2
Secondary	49	47.1
TVET	15	14.4
Total	104	100
Marital status		
Single	51	49.0
Married	35	33.7
widowed	3	2.9
divorced	15	14.4
Total	104	100

Table 2: Demographic data of the street fried food vendors considered in the study.

Frying practice by the street food vendors

As shown in Table 3, all the street food vendors used palm oil for frying activities. It might result from market accessibility and the relatively fair price of palm oil in Harar City during the surveying time. However, only some vendors used another type of oil for their deep frying practice, even for alternative approaches. In connection with this, a study by Emelike and Achinewu [9] revealed that food vendors mainly use palm oil for their frying activities. Therefore, palm oil is preferable by food vendors.

Concerning the utilization of palm oil, 71.2% of the vendors explained that they reuse the same oil frequently till the original oil color turns black. In line with this, in 2020, the same investigation result was reported by Emelike and Achinewu; vendors reuse the oil until the color becomes dark. It indicates that there is no fixed duration to reuse the oil. Reusing used oils multiple times can affect the physical and chemical properties of the oil, leading to toxic and carcinogenic production making it unfit for human consumption [10].

In the present study, 15.4% of the respondents were using discarded fried oil for more than three days of usage, 4.8% within three days, 7.7% used it until the flavor of the product was at an acceptable level, and only 1% of them were use frying oil for one time (Table 3). From the respondent's point of view, the vendors engaged in such activities lack awareness about the prolonged health problems associated with the sustained heating of palm oil.

The study also revealed food vendors' poor handling and management of temperature and cleaning of the fryer. In this regard, 98% of the vendors checked the frying temperature through their experience, and the rest checked it using sprinkled raw dough. Similarly, for cleaning the fryer equipment, 81.7%, 16.3%, and 2% were using dry cloth/sponge, hot water, and detergents, respectively.

It is evident that the prolonged frying of oils leads to the formation of a polymerized compound; it is viscous and accumulates on the surfaces of the fryer. If this accumulated substance is not removed from the fryer surface, it may further contaminate any fresh oil that will be applied to the fryer [11]. Consequently, it is essential to conduct regular cleaning before and after using the fryer to avoid contaminations.

In addition to the frying conditions, the type of utensils used for deep frying also contributes to the formation of Trans fatty acids (TFA) in the oil, which is underuse [12]. In this regard, the current study reveals that respondents used frying equipment made of stainless steel, cast iron, and brass, with a proportion of 44.2%, 35.6%, and 20.2%, respectively. Furthermore, frying equipment made of brass has been seen to cause the highest increase in TFA content on heating [13].

Figure 1 (a) shows that potato chips, Sambusa, and Bonbolino are the types of fried food sold by street food vendors. Potato chips take the lion's share of the fired food vendors sell with 42.31%, followed by Sambusa with 35.38%, and Bonbolino with 22.12%.

The type of frying equipment used by food vendors was also included in the present study. In line with this, figure 1 (b) shows that about 56% of respondents used pans heated with Charcoal/

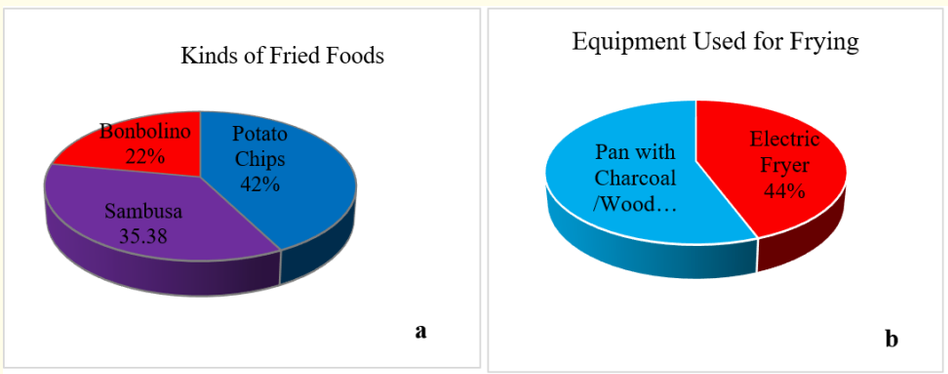


Figure 1: Type of fried food sold by street food vendors (a) and equipment used for frying (b).

wood fire, and the remaining 44% used stainless steel electric fryers to prepare fried food.

The study also revealed that the preferable vending location of the food vendors is the roadside. Most vendors belong to low-income families and need help renting, appropriately preparing, and selling stores. In this regard, figure 2 shows that about 84.62% of vendors were cooking and selling their fried food on the roadside. Even though the efforts made by the street food vendors are appreciated, the oil quality could be better since it is vulnerable to open-air dust around the road due to several movements. In Malawi, a similar report was presented by Phiri., *et al*. [14], which depicted that the majority of informal fried food processors are working on the roadside among these, 8.65% in the container and 6.73% in the stall.

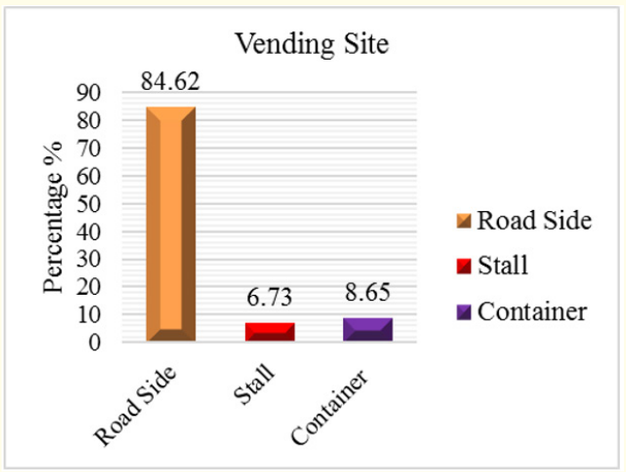


Figure 2: Vending site.

The present study also assessed the selection criterion of oils by the food vendors, including flavor, price, availability, and durability. In connection with this, figure 3 (a) shows that 76.92% of the respondents selected frying oil due to the low price rather than another criterion. This result agrees with the work of Mcsavage and Trevisan [11], which reported that food processors select their frying oil because of price.

Earlier, it has been mentioned that frequent reuse of frying oil leads to cause many health problems for the end-user. In this regard, figure 2 (b) illustrates the food vendors' daily usage of frying oil. The assessment revealed that 56.7% of the respondents were using their frying oil 10-20 times, 25% were using for 5-10 times, and 18.3% were using for 2-4 times. Generally, this approach is considered a bad practice that renders the oil susceptible to thermal oxidation and degradation. Further, it leads to hypertension in human health [15].

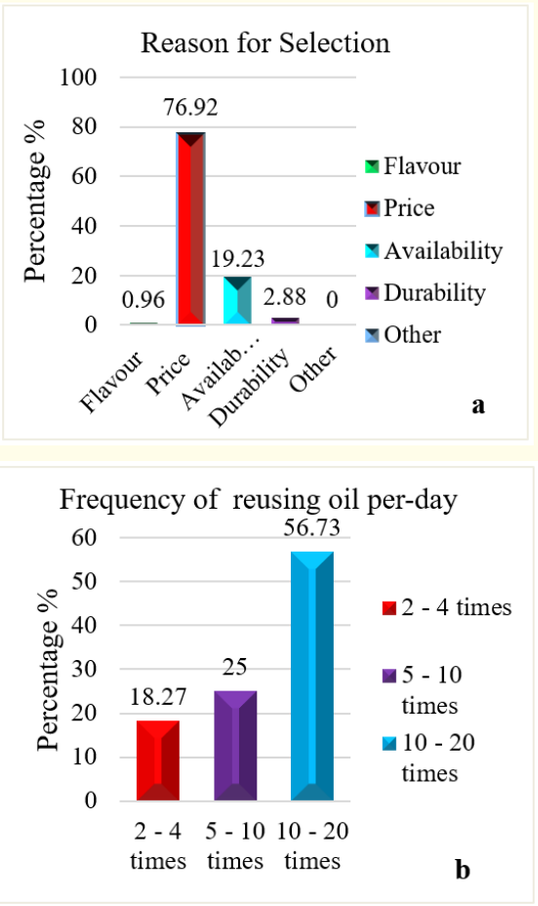


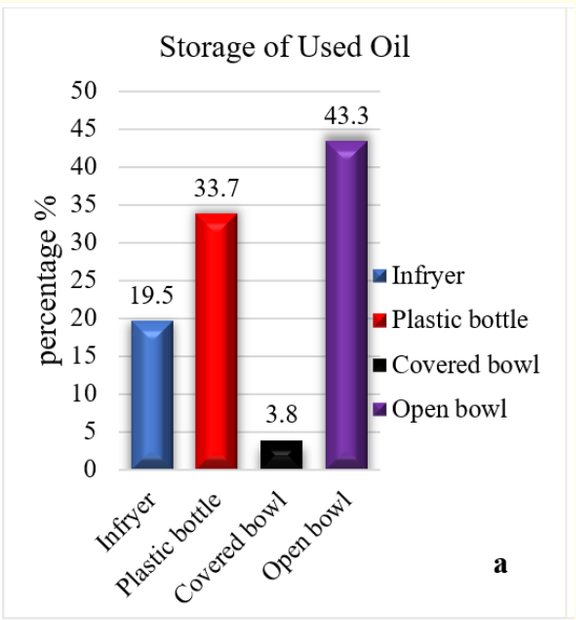
Figure 3: Reason for selection of oil (a) and frequency of reusing oil per day (b).

Handling practice of used oil by vendors

The other common problem observed during surveying was the vendors' poor handling mechanism of used oil. Figure 4 (a) depicts that 43.3% of the respondents used an open bowl to store the used oil for the next round or the next day's frying process. Handling used oil in the open bowel can significantly affect the oil's nature and lead to the formation of undesirable chemical substances. In line with this, the prolonged exposure of oils to open air and sunlight leads to the breakdown of the oil chemical bonds [14]. In addition to that, the storage materials of used oil also have a significant impact on the oil conditions. For instance, storing oil in plastic bottles leads to the formation of chemicals from the plastic seep into oil, and the oil will be exposed to sunlight [16].

It is necessary to consider the manufacturer's instructions to prevent the formation of oxidation and further degradation of the oils under its storage. For example, storing oils in opaque or colored materials can inhibit oxidation [17]. In general, the shelf life of frying oils can be affected by environmental factors like light, temperature, and oxygen pressure [18].

The other point noticed during surveying was the usage of mixed oil (i.e., a mixture of fresh and fried oil). In this regard, figure 4 (b) reveals that 94.23% of the respondent was using a mix of fried oil with new oil without a filter for frying purposes. This observational result is agreed with the research work of Esfarjani., *et al*. [18]. If product remnants are not removed regularly, they continue cooking until charred. These provide 'focal points for further degradation [11]. Many scientific findings have recommended that upon the completion of the frying process, it is necessary to filter the oil to remove the food particles and bread crumbs since they accelerate the oil deterioration rate. In connection with this, some respondents (4.8%) attempted to preserve the consistency of the oil used for frying through filtration to extract food contaminants or other particles before mixing with new oil as Carson and State [10] indicated that the oxidation of fried oil could be minimized by combining fresh oil with already used oil. Hence, filtration extends the oil usage span by eliminating crumbs and other particles. Some fried food vendors surveyed have correctly refilled used oil with fresh oil. It is a clever idea, as the fresh oil applied to the frying process would compensate for losses due to the frying process. It is also consistent with another Chebet., *et al.* [19] analysis.



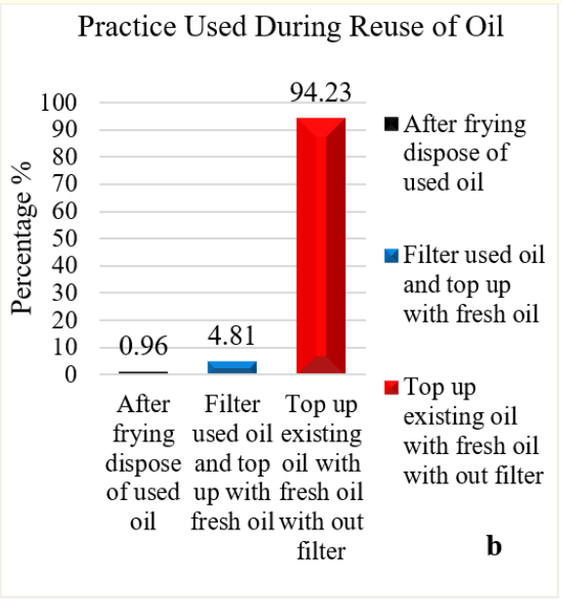


Figure 4: Storage practice of used frying oil (a) and Practices used during reuse of oil (b).

Conclusions

The level of knowledge of the quality of oil frying by fried food vendors in Harar City, Ethiopia, needs to be improved. The study outcomes revealed that the vendors need to be made aware of the proper use of oil throughout the frying process. The respondents need to learn about the storage of reused oil, frequency of oil use, and filtering of cooking oils after the frying operation. As a result, vendors must be trained appropriately by health professionals and other stakeholders. This study has therefore provided baseline data of current takeaway practices that can be compared with future monitoring surveys in response to interventions and training programs.

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