

## Knowledge, Attitudes and Reported Practices of Women about Hazards of Frequently Heated Cooking Oil in the Rural of Sohag District

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### Abstract

**Background:** Frequent heating oil practice is widespread, the useful role of vegetable oils become worsen when frequently treated with higher temperature and air makes it harmful for human consumption. **Aim:** to assess knowledge, attitudes and reported practices of women about hazards of frequently heated cooking oil in the rural of Sohag district. **Design:** Descriptive cross-sectional study was included 220 women attending two health units that randomly selected from health units of Sohag district. **Methods:** A structured questionnaire was administered through face-to-face interviews by the researchers. All respondents were interviewed throughout the period from the first of March to the end of August 2024. It comprised five main parts; **Part I:** Demographic data. **Part II:** Self-Reported health problems of study participants. **Part III:** Women's knowledge concerning hazards of frequently heated cooking oil. **Part IV:** Women's attitudes regarding usage of hazards of frequently heated cooking oil. **Part V:** Women's reported practices regarding hazards of frequently heated cooking oil. **Results:** The study revealed that 55.5 % of women aged  $\geq 30$  years, 83.6 % of them were housewives. Alongside 93.2% of them had poor knowledge regarding hazards of frequently heating cooking oil. **Conclusion:** Women had poor knowledge, negative attitudes and poor practices about hazards of frequently heated cooking oil, so they and their family at higher risk for different health and environment related problems. **Recommendations:** The study recommended that further researches on a larger study sample are needed to allow for generalization of the study results, improving women's knowledge, attitudes and practices by conducting educational programs.

**Keywords:** Attitudes, Hazards, Knowledge, Frequently Heating Cooking Oil & Reported Practices.

### Introduction:

Deep frying oil is the greatest common and one of the oldest means of food preparation globally, offering color, taste, flavor, and fried consistency. Frequent heating oil practice during food preparation processes is prevalent. The useful role of plant oils become worsen when recurrently treated with higher temperature and air and result in changed physical features of the oil with increase in its consistency, change of color (darkening), frothing and reduction in smoke point, which may change the fatty acid composition of the oil and makes it hurtful for human consumption (Rajendran et al., 2022).

Frequently heated cooking oil refers to the practice of reusing same cooking oil in several frying sessions it has been used interchangeably with thermally oxidized oils or recycled oils. When cooking oil is reheated excessively, the chemical reactions enhance, causing rapid degradation to the cooking oil both chemically and physically. Extended exposure of cooking oil to high temperatures and air can lead to highly oxidized and toxic products to form and accumulate in the cooking oil. Moreover, it changes the structure of proteins, vitamins and antioxidants, as

well as, nutrients in food. Cooking oil worsens in quality and loses its healthy value with frequent frying (Abd Rahman et al., 2021).

It is scientifically proven that frequent heating of cooking oil produces diseases especially non communicable diseases varying from cardiovascular conditions, diabetes, hypertension, atherosclerosis, Alzheimer's disease, too liver and kidney failure. Also frequently heated cooking oils produce numerous byproducts, containing polycyclic aromatic hydrocarbons and aldehydes, well-known to be a carcinogenic, mutagenic, and tumorigenic properties. frequently heated cooking oils is one of the often consumed means for cooking and frying, which intake can cause various unwholesome adverse effects including various cancer in many organs (Ganesan & Xu, 2020; Zula & Teferre, 2022).

Non communicable diseases remain an important public health challenge in all nations which result in many NCDs related deaths. Heart diseases account for most NCDs deaths, or 17.9 million people yearly, followed by tumors (9.3 million), respiratory diseases (4.1 million), and diabetes (1.5 million). The epidemic of NCDs has overwhelming health

consequences for persons, families and societies (WHO, 2021).

In order to improve knowledge about dangers of frequently heated cooking oil, more awareness campaign about this matter should be highlighted in the mass media. In addition to public communication campaigns that focus on households, school children, and restaurants. Some of the policy suggestions from the experts include effective monitoring, strict implementation of existing laws, incentivizing used cooking oil collection, visual warnings about the harm of frequently heated cooking oil consumption on oil packets, and appropriate labels as well as advertisements. There are many challenges related to non-communicable diseases. Obesity, for instance, is a risk factor for many diseases that is intensified by consumption of frequently heated cooking oil (Goveas et al., 2022 ).

Community health nurses have a vital role in disease prevention and health promotion, they are the key stakeholders to control NCDs resulted from consumption of frequently heated cooking oil at the community level. Nurses role in community is to educate the populations, food workers, women, all the cooking staff about hazards and risks of frequently heated cooking oil by conducting educational sessions to women. Working collaboratively with school nurses. Supervising social media regarding the nutritional content. Moreover, inter-professional and collaborative working is also encouraged to improve community health outcomes. Community health nurses provide crucial follow up to behavioral interventions that aim to modify the key risk factors for NCDs and give health education regarding promotion of health (Imamatsu & Tadaka, 2022).

### **The significance of the study:**

Food and drug administration ( FDA ) 2020 shows that heating cooking oil several times produces aldehydes, a kind of toxic substance that can form cancerous cells in the body which stimulate the abnormal cells in preschool children 3:5 years and contributing the leukemia among them by 22 %. Frequently heated cooking oil suppress the immunity system of children and inhibit T. cell growth which enable multiple infectious disease to invade their bodies easier than healthy children the 45 % of those kids show low resistance against influenza, chicken box and Pneumonia ( Food Safety And Standards Authority Of India, 2020).

Frequently heated cooking oils change the manifestation of drug metabolizing enzymes, a drug transporter, and fatty acid regulatory genes result in oxidative damage, inflammation, and collection of fatty acids in the liver (Chatuphonprasrt et al.,

2020). Study done in Punjab (2022) indicated that ingestion of frequently heated cooking oil resulted in liver cancer with incidence rates (17.13 per 100,000 men over 35 years and 10.93 per 100,000 women over 35 years) (Jubeen et al., 2022 ).

There were an estimated 18 million cancer cases around the world in 2018, of these 9.5 million cases were in men and 8.5 million in women. After lung (12.3%) and breast cancer

In Egypt in 2022 the incidence of cancer was 150 578 new cases, most frequent occurring cancers were liver cancer (18.6%) and breast cancer (17.8%) (Ferlay et al., 2024). The recurrently heated cooking oil negatively effect on health of human being. However, there is a paucity of research in this area in Egypt. Since, the nurse has pivotal role to identify the knowledge, attitude and practices of women toward frequently heating cooking oil.

### **Aim of the study:**

To assess knowledge, attitudes and reported practices of women about hazards of frequently heated cooking oil in the rural of Sohag district.

### **Research question:**

- What's the level of knowledge of women about frequently heated cooking oil in the rural of Sohag district?
- What are the attitudes of women about frequently heated cooking oil in the rural of Sohag district?
- What are the reported practices of women about frequently heated cooking oil in the rural of Sohag district?

### **Subjects and Methods:**

#### **Research Design:**

A descriptive cross-sectional research design was used in this study.

#### **Setting:**

Study was conducted at two health units in two villages selected randomly include: El-hamadia in the North and Nagh El-Nagar village in the South of Sohag district.

#### **Sample:**

Total number of women attending health units is (7965) yearly, about 664 women monthly and about 26 women daily. Using G Power Program (3.1.9.4) for sample size calculation with the following assumptions:

Alpha errors = 0.05

Power (1- B) = 0.8

Effect size ( small) = 0.2

Using paired samples to test, the estimated sample size was found to be 199 women. To compensate for the dropout; (10 %) was added to the sample size, The final sample size was be 220 participants.

**Inclusion criteria:** The study was conducted on women who attended to the selected health units and accept to contribute in the study.

**Exclusion criteria:** young female under age of 18 years.

**Tools of study :**

A structured interview questionnaire was developed by the authors, guided by a review of relevant literature (part III, IV and V ), to evaluate the participants' knowledge, attitudes and reported practices toward frequently heated cooking oil, it comprises five parts:

**Part (I):** Demographic characteristics include: name, age, education level, occupation, number of family members.

**Part (II):** Women's medical history of non-communicable diseases & family medical history of non-communicable diseases include: diabetes mellitus, hypertension, cancer, heart disease, kidney disease and others.

**Part (III):** Assess women's knowledge about frequently heated cooking oil include: the meaning of frequently heating cooking oil, the sources of cooking oil, components of cooking oil, oil can be heated and shouldn't be heated, frying in the same oil, frequency of frying in the same oil, changes with frequent heating and nutritional importance of edible oil, factors help in choosing oil, type of health problem caused by frequent heating cooking oil and cooking methods to reduce health risks, environmental problems of frequently heating cooking oil and methods to reduce these problems, meaning of discarded cooking oil, disposing of discarded cooking oil correctly and safely by competent entity, name of the entity, place should the used cooking oil be disposed, the hazards resulting from disposing of oil discarded in sinks and bathrooms, the hazards resulting from the disposal of oil waste in soil and agricultural lands, source of information and need for more information about this issue.

**The scoring system of knowledge:** The scoring system followed each correct answer given (1 grade) and incorrectly given (0 grade). Total scoring (55 grades) was classified as: if the score was <50 % (<27.5 grades) indicated poor knowledge, if was 50-70 % (27.5-38.5 grades) indicated fair knowledge, and if was >70% (>38.6-55 grades) indicated good knowledge (Abdul Shukor & Rostam, 2020).

**Part (IV):** Assess women's attitudes regarding the usage of frequently heated cooking oil. It includes 9 statements on a Likert scale, each statement has a response as Agree (1), Disagree (2), and Uncertain (3), include: Using oil in food preparation is essential, heating cooking oil frequently to fry food is a good practice as it saves cost and has no side effects, The quality of the oil used for frying remain

the same no matter how many times reheat the oil, The oil used for several times and not get rid of it until it turns a dark black color, There is a loss of nutrients in frequently heated cooking oil used for frying, The type of oil does not affect the damage resulting from frequent heating, Frequent frying in the same oil have harmful effects on health, It is permissible to dispose of oil waste in the sink or drain and there are alternative methods for frying in oil that are more beneficial to health (Abdul Aziz et al., 2018) .

**The scoring system of Attitude:**

There are 5 items with statements of negative meaning (items 2,3,4,6 and 8) and positive meaning (items 1,5,7 and 9) score of attitude is 18. A score < 70% (<12.6) indicated a negative attitude, while a score >70% (>12.6) indicated a positive attitude toward the usage of frequently heated cooking oil.

**Part (V):** Assess women's reported practices regarding the usage of frequently heated cooking oil include: the type of oil used, reason of prefer certain oil type and frequency of eating fried food per week, frequent frying in same oil, frequency of reheating oil, reason for frequent use the cooking oil, reason for not frying frequently with the same oil, food which be fried using frequently heated oil and using used cooking oil to fry more than one type of food, completely dispose of the used oil and change it, collect waste cooking oil to send it to specialists, place of disposing used oil, the reason for not collect the used oil and place of sending the waste oil, methods to preserve used oil, steps to save used oil for use again and methods to maintain the quality of cooking oil, clean the pan, materials use for pan cleaning again, methods to reduce the health risks of frequently heating oil and methods to reduce the risks of frequently heating oil on the environment (Abdul Shukor & Rostam, 2020; Poornima & Nutan, 2019)

**Scoring system of practices:**

It was calculated according to the total degrees of (42). One (1) degree was awarded for each achieved item, and zero (0) was awarded for not achieved. It was classified as poor score of reported practices if the degrees was <50% (<21), fair score if the degrees were 50-70 % (21-29.4), and good score of reported practices if the score were >70% (>29.5-42).

**Validity:**

Five academic professionals from the Assiut University Nursing Faculty's community health nursing department verified the face validity of the instruments. They checked the tools to make sure they were clear, thorough, appropriate, and comprehensible.

**Reliability:**

The reliability was analyzed by Cronbach's alpha coefficient test for the knowledge questionnaire, attitude and reported practices. It was found to be (0.840, 0.851 and 0.792) respectively.

**A Pilot study:**

It was carried out before data collection on **10%** (n= 22) of women, which were included in the study. The pilot study aimed to test the clarity of the tool and to determine the time needed to fill the questionnaire. There is no variation in the tool used for the study, so the pilot sample included in the study sample

**Data collection:**

Data was collected from the first of March 2024 to the end of August 2024, two days weekly/ three hours per day. Informed consent was gained from studied women to participate in this study, after clarification of the purpose of the study to get their cooperation before beginning data collecting.

**Ethical considerations:**

The ethical committee at the Faculty of Nursing has accepted the study plan (Approval no: 1120240527). There was no danger to the subject of the research during the implementation of the study. Participants were directed by their right to withdraw from research at any time. Confidentiality and anonymity were assured. The study followed common ethical principles in clinical research.

**Statistical Analysis:**

Data entry and data analysis were done using SPSS version 22 (Statistical Package for Social Science). Data were presented as frequency, percentage, mean, and standard deviation. The chi-square test was used to compare between qualitative variables. P-value considered statistically significant when  $P < 0.05$

**Results:**

**Table (1): Distribution of the studied women according to their demographic data in the rural of Sohag district, 2024 (N=220)**

Demographic data	No. (220)	%
<b>Age: (years)</b>		
< 30	98	44.5
≥ 30	122	55.5
Mean ± SD	32.55 ± 9.41	
<b>Educational level:</b>		
Less than secondary education	23	10.5
Secondary education	162	73.6
University or higher education	35	15.9
<b>Occupation:</b>		
Worker	36	16.4
Housewife	184	83.6
<b>Number of family members:</b>		
< 5	97	44.1
5 or more	123	55.9
Mean ± SD	5.10 ± 1.63	

**Table (2): Total score of knowledge regarding the hazards of frequently heated cooking oil among studied in the rural of Sohag district, 2024 (N=220).**

Knowledge level	(n= 220)	
	No.	%
<b>Poor</b>	205	93.2
<b>Fair</b>	15	6.8
<b>Good</b>	0	0.0
<b>Mean ± SD</b>	9.88 ± 3.26	

**Table (3): Relation between studied women's knowledge and their demographic data regarding the hazards of frequently heated cooking oil in the rural of Sohag district, 2024 (N=220).**

Demographic data	Knowledge score	
	Mean $\pm$ SD	P-value
<b>Age: (years)</b>		
< 30	10.29 $\pm$ 3.40	0.096
$\geq$ 30	9.55 $\pm$ 3.12	
<b>Educational level:</b>		
Less than secondary school	8.04 $\pm$ 2.08	
Secondary school	9.21 $\pm$ 2.55	<0.001*
University or higher	14.17 $\pm$ 3.39	
<b>Occupation:</b>		
Worker	12.67 $\pm$ 4.12	<0.001*
Housewife	9.33 $\pm$ 2.76	
<b>Number of family members:</b>		
< 5	10.15 $\pm$ 3.36	0.263
5 or more	9.66 $\pm$ 3.17	
<b>Chronic diseases:</b>		
Yes	9.13 $\pm$ 2.53	0.168
No	10.00 $\pm$ 3.35	
<b>Family history of chronic disease:</b>		
Yes	9.91 $\pm$ 3.29	0.917
No	9.86 $\pm$ 3.26	

\*Statistically significant difference

chi-square test

**Table (4): Relation between studied women's attitude level and their demographic data regarding the hazards of frequently heated cooking oil in the rural of Sohag district, 2024 (N=220).**

Demographic data	Mean $\pm$ SD	P-value
<b>Age: (years)</b>		
< 30	9.67 $\pm$ 3.00	0.125
$\geq$ 30	9.03 $\pm$ 3.13	
<b>Educational level:</b>		
Less than secondary school	7.00 $\pm$ 2.71	
Secondary school	9.20 $\pm$ 2.92	<0.001*
University or higher	11.40 $\pm$ 2.79	
<b>Occupation:</b>		
Worker	10.44 $\pm$ 3.19	0.016*
Housewife	9.10 $\pm$ 3.02	
<b>Number of family members:</b>		
< 5	9.53 $\pm$ 2.97	0.376
5 or more	9.15 $\pm$ 3.17	
<b>Chronic diseases:</b>		
Yes	8.48 $\pm$ 3.34	0.104
No	9.46 $\pm$ 3.02	
<b>Family history of chronic disease:</b>		
Yes	8.91 $\pm$ 3.26	0.191
No	9.50 $\pm$ 2.99	

\*Statistically significant difference

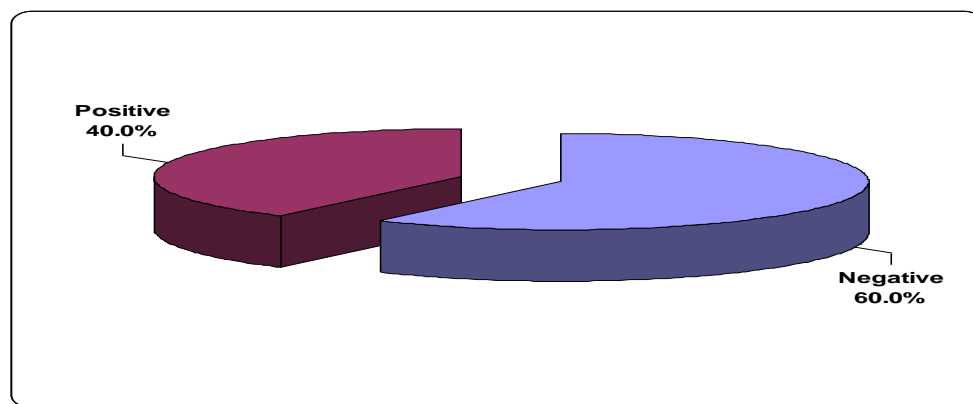
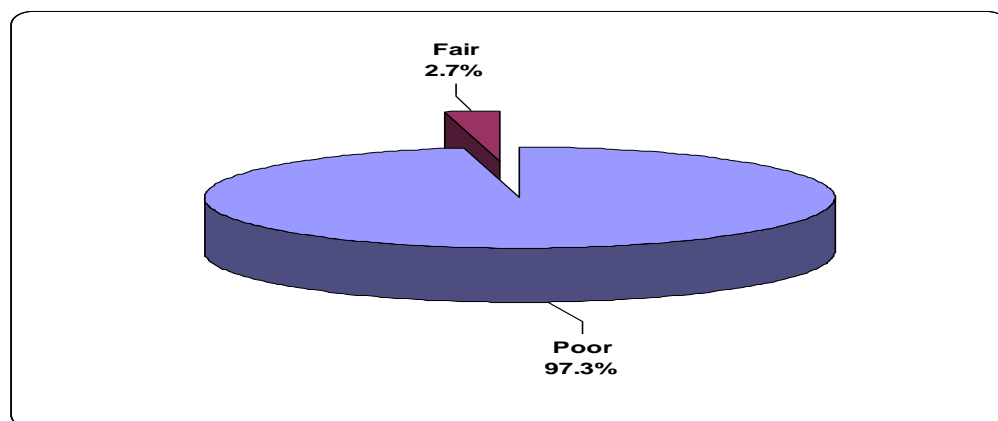
chi-square test

**Table (5): Relation between studied women's reported practice level and their demographic data regarding the hazards of frequently heated cooking oil in the rural of Sohag district, 2024 (N=220).**

Demographic data	Mean $\pm$ SD	P-value
<b>Age: (years)</b>		
< 30	14.63 $\pm$ 2.36	0.198
$\geq$ 30	14.17 $\pm$ 2.82	
<b>Educational level:</b>		
Less than secondary school	12.87 $\pm$ 2.24	
Secondary school	14.07 $\pm$ 2.20	<0.001*
University or higher	16.80 $\pm$ 3.22	
<b>Occupation:</b>		
Worker	15.72 $\pm$ 3.19	<0.001*
Housewife	14.11 $\pm$ 2.43	
<b>Number of family members:</b>		
< 5	14.24 $\pm$ 2.37	0.484
5 or more	14.49 $\pm$ 2.82	
<b>Chronic diseases:</b>		
Yes	13.74 $\pm$ 3.10	0.147
No	14.48 $\pm$ 2.54	
<b>Family history of chronic disease:</b>		
Yes	14.13 $\pm$ 2.88	0.357
No	14.49 $\pm$ 2.51	

\*Statistically significant difference

chi-square test

**Figure (1): Total score of the studied women's attitudes regarding the hazards of frequently heated cooking oil in the rural of Sohag district, 2024 (N=220)****Figure (2): Total score of the studied women's reported practices regarding the hazards of frequently heated cooking oil in the rural of Sohag district, 2024 (N=220)**



**Table (1):** It illustrates that 55.5% of women aged  $\geq 30$  years old. According to educational level of women it reveals that 73.6% of women had a secondary level of education. According to women's occupation, 83.6% of women were housewives while 16.4% of them were workers. Concerning number of family members, it observes that 55.9% of women's family had 5 members or more.

**Table (2):** Demonstrates that the total score of studied participants' knowledge regarding hazards of frequently heating cooking oil in the rural of Sohag district. It shows that 93.2% of studied women had poor knowledge score.

**Table (3):** Shows that the relation between respondents' knowledge and their demographic data regarding the hazards of frequently heating cooking oil in the rural of Sohag district. It observes that there were statistical significant differences between studied women's educational level and occupation with knowledge p-value  $< 0.001$ .

**Table (4):** Shows that the relation between studied respondents' attitude and their demographic data regarding the hazards of frequently heating cooking oil in the rural of Sohag district. It observes that there were statistical significant differences between women's educational level and occupation with attitude p-value  $< 0.001$  and  $= 0.016$  respectively.

**Table (5):** Shows that the relation between studied women's reported practices and their demographic data regarding the hazards of frequently heating cooking oil in the rural of Sohag district. It observes that there were statistical significant differences between studied women's educational level and occupation with reported practices p-value  $< 0.001$ .

**Figure (1):** Demonstrates that the total score of the participants' attitude concerning hazards of frequently heating cooking oil in the rural of Sohag district. It shows that 40.0% of respondent women had a positive attitude.

**Figure (2):** Demonstrates that the total score of respondent women's reported practices about hazards of frequently heating cooking oil in the rural of Sohag district. It illustrates that 97.3% of studied women had poor practices.

## Discussion

Reusing or reheating of cooking oil can lead to so many health problems like experiencing acidity frequently and rise in cholesterol levels. This is a very usual practice in the common people's kitchen and lifestyle. This situation is very dangerous and the problem is ignored so much and no one pays attention to the after effects of this. When the already used oil is reheated, it let out a higher concentration of varied toxic chemicals such as; Aldehydes that are linked with multiple health glitches like heart-related

ailments, cognitive problems including dementia, Alzheimer's, and Parkinson's disease (Szabo et al., 2022). Therefore the current study aimed to assess knowledge, attitudes and reported practices of women about hazards of frequently heated cooking oil in the rural of Sohag district.

Regarding the studied women demographic data the current study found that more than half of women aged  $\geq 30$  years old. This may be due to women's marriage in young age in rural areas and Upper Egypt. These results were supported by Okalany et al., (2023), who carried out a study in Uganda and revealed that the majority of participants aged 29–39 years old.

According to educational level of women it was found that nearly three quarters of participants had a secondary level of education. This may be because in rural areas females not allowed to complete their higher education. The findings were different from Emelike et al., (2020), who carried out a study in Nigeria and revealed that two fifth of women hold primary education.

According to women's occupation, the majority of women were housewives while less than one fifth of them were workers. This may be due to moderate levels of education which offer less job opportunities for females. These results were supported by Cahyaputri & Hasibuan (2023), who carried out a study in Indonesia and revealed that more than two fifth of the participants' occupations are housewives. Furthermore, the current study found that more than half of women's family had 5 members or more. This may be due to preferences and desire to have many children in Upper Egypt regions. These results were compatible with the study performed by Houmani et al., (2024), in Lebanon, who revealed that nearly half of participants had  $\geq 5$  family members.

As regard to total score of the participants' knowledge level about the hazards of frequently heated cooking oil, the current results show that most of studied women had poor knowledge score. This may be attributed to moderate levels of women's education besides lack of conducted educational programs regarding health hazards of frequently heated cooking oil.

These results were disagree with Abdul Aziz et al., (2018), who conducted a study in Malaysia which titled "Repeatedly Heating Cooking Oil among Food Premise Operators in Bukit Mertajam, Pulau Pinang and Determination of Peroxide in Cooking Oil" showed that more than half of respondents had moderate level of awareness. These results were incongruent with Azman et al., (2012), who carried out a study in Kuala Lumpur which titled "Level of knowledge, attitude and practice of night market food outlet operators in Kuala Lumpur regarding the usage

of repeatedly heated cooking oil" and revealed that more than half of respondents had only moderate level of knowledge.

According to total score of the studied women's attitude level regarding the hazards of frequently heated cooking oil, the results of study show that two fifth of participants women had a positive attitude. This may be due to lack of women's knowledge regarding health hazards of using heated oil multiple times.

These results were different with the study conducted by **Azteria & Handayani, (2024)**, in Indonesia who revealed that less than two thirds of respondents had negative attitude. These results were incongruent with **Sujang et al., (2016)**, who did a study in Malaysia, who found that the respondents were shown to have a good attitude levels to the usage of recurrently heated cooking oil.

Concerning total score of the studied women's reported practice level about the hazards of frequently heated cooking oil, the current results demonstrate that almost all of studied women had poor practices. this may be attributed to low women's socio economic status that play significant role in shaping women practices.

These results were different from the study conducted by **Abdul Aziz et al., (2018)**, who showed that half of respondents had moderate practice. These results were congruent with the study carried out by **Abdul Shukor & Rostam, (2020)**, in Malaysia which entitled "Knowledge, attitude, practice of night market food handlers regarding the use of repeatedly heated cooking oil in Kuantan, Pahang" and revealed that more than two thirds of respondents had a bad practice.

According to relation between studied women's knowledge level about the hazards of frequently heated cooking oil and demographic data the current study showed that there were statistical significant differences between studied women's educational level and occupation with knowledge. this may be because high education levels improves women's cognitive abilities, enhance their self-learning which enable them to become well informed.

These results were supported by **Abdullah et al., (2015)**, who studied "Awareness regarding the usage of repeatedly heated cooking oil in Kuala Lumpur, Malaysia" and revealed that respondents with higher level of education had significantly higher level of awareness. These results disagreed with **Abdul Shukor & Rostam, (2020)**, who found that participants with lower educational level had significantly higher level of knowledge regarding this issue.

Regarding relation between studied women's attitude level and their demographic data, the present study

showed that there were statistical significant differences between women's attitude with their education and occupation. This may be explained by the effect of higher educational levels in creating informed and preventative attitudes toward health by providing knowledge that empowers women to take control of their family health.

These results were consistent with the study conducted by **Altuntaş et al., (2022)**, who revealed that there were statistical differences according to the answers given by Turkish consumers to the questions directed to them, depending on their education status. These findings were in line with **Abdullah et al., (2015)**, who found that respondents with higher level of education had significantly association with their attitude.

Concerning relation between studied women's reported practice and their demographic data regarding the hazards of frequently heated cooking oil the current study showed that there were statistical significant differences between studied women's educational level and occupation with reported practice. This may be due to higher educational levels enhances individuals access to knowledge and awareness regarding healthy practices.

### Conclusion:

This study concluded that studied women had poor knowledge, negative attitudes and poor practices about hazards of frequently heating cooking oil so they at higher risk for health hazards and environmental hazards related to frequently heated cooking oil.

### Recommendations:

- Conduct further researches on a larger study sample to allow for generalization of the study results.
- Improving women's knowledge, attitudes and practices about hazards of frequently heated cooking oil by conducting educational programs.

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