Sudan University of Science and Technology

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Food Safety Knowledge and Practices among Women in Nile river state

معرفة و ممارسة سلامة الغذاء بين النساء في و لاية نهر النيل

By

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Dedication

This work is dedicated to my parents and daughter

Acknowledgement

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Abstract

This cross sectional study was carried out in Nile River state to evaluate food safety practice and knowledge in the homeand identify specific behaviors during food purchase, storage and preparation. A sample of individuals ($n = 100$) living in the study area were , participate. All participants were randomly recruited and underwent a questionnaire-based interview at their home regarding food-safety measures. The demographic characteristics and knowledge practice of food safety. Risks of hazardous practices in the home were calculated according to educational, physical, and marital status. All analyses were performed using the SPSS statistical program. Data showed that there was an insufficient amount of knowledge regarding foodborne diseases and food safety. In most families, we found that there was a lack of correct adherence to food hygiene, mainly due to errors during both food preparation and storage. The findings confirm that the home environment represents an important site for the spread of pathogens responsible for foodborne diseases. In order to adopt good hygiene practices in the home setting, consumers need to be informed about safety procedures of domestic food handling, storage and preparation.

Arabic Abstract

هدة دراسة مقطعية اجريت في ولاية نهر النيل,لتقيم معزفة وممارسة سلامة الاغدية في المنازل ومعرفة سلوك معين اثناء عملية شراء,تخزين وتحضير الطعام.اشتركت في هده الدراسة 100 من النساء اختيرت عشوائيا خضعت لاستبيان لمعرفة نوعية الاساليب التي تمارسها.خصائص الفرد الفردية ,معرفة ممارسة الاغديةومخاطر الممارسات الجطيرة في المنازل المدروسة وفقا للتعليم,الطبيعة والحالة الاجتماعية.كل التحاليل لهده الدراسة كانت بالبرنامج SPSSالاحصائي اظهرت البيانات ان هدا العدد غير كافي لمعرفة الامراض المنقولة بالغداء الملوث.وسلامة الاغدية.في اغلب الاسر,وجدنا عدم الالتزام بصحة الغداء ناتج اساسا من الخطاء اثناء تحضير وتخزين الغداء واثبت اخيرا ان البئة المنزلية تمثل اهم جانب في انتشار الامراض المنقولة عن طريق الغداء الملوث ولكي تتخد الممارسات الصحية الجيدة في البيت الحالي,محتاج المستهلك .تعلم الاجراءت السليمه لتناول,تخزين وتحضير الطعام

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Introduction

Food safety was defined as the degree of confidence that food would not cause sickness or harm to the consumer when it was prepared, served and eaten according to its intended use (2003). World Health Organization reported that some (40%) of food borne illnesses resulted from the consumption of food prepared in the home. Studies had suggested that case of food borne diseases originating in the home were less likely to be reportedRedmondetal. 2003). Redmond and Griffith (2003) estimated that between 50 and 87% of reported outbreaks of food borne disease had been associated with food prepared at home. (1998) identified the kitchen as an area highly contaminated by various strains of bacteria. Therefore, that the private home was a crucial location in which food borne disease were

engendered. Food could be mishandled at any number of stages during its preparation, handling and storage. The studies showed that many consumers were inadequately informed about measures needed to prevent food borne diseases in the home (Medeiros italic., 2001). According to and Griffin (1990) and et al. (2008), food borne disease has been associated with improper storage or reheating and with cross-contamination. Some cases from food borne diseases acquired in the home were resulted from eating undercooked food of animal origin or from engaging in unsafe food preparation practices et al., 1995; et al., 2008).

Earlier studies in adults had shown that knowledge about food safety tended to increase with age, the level of education, and experience in food preparation. In many societies, women were more informed about appropriate methods of food-handling and storage than men. Better educated individuals often recognized the importance of food safety, and younger respondents had shown the greatest need for additional education about food safety.

Objective:

-To determine the knowledge, attitudes and practices o f food safety in the Nile river state,

-To describe the knowledge of people with regard to food safety and hygiene.

-To determine the attitudes of people toward food safety and hygiene.

Chapter One

Literature Review

1.1Background

It has been widely demonstrated that the private home setting is considered the first place in which foodborne diseases develop due to poor personal

and/or environmental hygiene with an increased risk of infection. According to WHO, over 30–40% of foodborne disease cases occur in the home and in Italy, approximately 30,000 cases/year have been observed: (55–75% due to outbreaks and 25–40% attributable to homemade preparation) (IstitutoSuperiore 2006 Foodborne diseases are progressively increasing and the number of reported cases are underestimated due to the lack of outbreak reports in the home setting (atal2003 Tauxe2002 IstitutoSuperiore di Sanità2003 .

At the moment, most purchased foods are considered safe; however, there still remains the need for consumers to correctly preserve these food items. Indeed, consumers represent the final step for food preparation and prevention of foodborne illnesses (Kagan italic2002; Redmond italic2003. In order to adopt good hygiene practices in the home setting, it is necessary to reduce the risk of improper food handling and storage**.** According to Redmond *et al* (2003), **Surujlal and Badrie (2004)**, behaviors of the consumers at home may be considered as a good reflection of their knowledge or at least what they believe regarding food safety. Sofood safety experts have identified the most common food-handling mistakes made by consumers at home. These mistakes include serving contaminated raw food, cooking or heating food inadequately, obtaining food from unsafe sources, cooling food inadequately, allowing 12 hours or more between preparation and eating, and having a colonized person handle implicated food or practice

poor hygiene. The same factors were identified in mishandling associated with specific pathogens (Bruhan 1997).

According to all above there are five behavioral constructions (control food factors) or a good food handling to intervention effectiveness on food safety and to ensure reducing the risk of the most prevalent and/or serious causes of foodborne illness. These are practice personal hygiene, cook foods adequately, avoid cross-contamination, keep foods at safe temperatures, and avoid food from unsafe sources(Lydia *et al* 2001;lossaso*et al* 2012,). Conducting researches on food safety, food-borne illnesses, food preparation practices and risks of food-borne illnesses should be taken into consideration while establishing food safety educational programs and material developments. It is thought that consumer's behaviors and attitudes toward safe food should be taken into account in order to completely define the term “food safety” and to determine the wrong behaviors and beliefs of the consumers. Also it should be so important to educate the consumers through understanding their diverse food safety issues relevant to them (Wilcock*et al*, 2004). Consumers generally express their concern on food safety, yet relatively only a few of them appear to be changing their food buying and consumption behaviors in view of their concern. According to Henson and Traill (1993), food safety is the inverse of food risk and can be expressed as the probability of not suffering some hazard from consuming a specific food. In general, consumers concern are based on several risk factors like natural contaminants (e.g. mycotoxins, heavy metals), agro-chemicals (e.g.

pesticides, nitrate), veterinary drugs (e.g. antibiotics), and packaging materials.In this regard, Arie*et al.,* (2010) stated that microbial hazard differs fundamentally from chemical hazard. While chemical residues and additives typically enter the food chain at more or less predictable steps, microbes can enter at any step.On the other hand, Brewer *etal.* (1994) revealed that there are six important factors that dominate the consumer's behaviors and choice toward food safety. These are; chemical issues (e.g. hormones and food additives), health issues (e.g. cholesterol content and nutritional imbalance), spoilage issues (e.g. microbiological load and contaminations), food regulatory issues (e.g. food inspection and labels), deceptive practices (e.g. weight-loss diets) and ideal situations (e.g. length of time for pesticide safety assessment). These factors may change from one research to another because of the consumer profile taken into examination.

1.2 Food borne Diseases

Contaminated food and water have been known to be sources of illness in human societies since antiquity. Foodborne diseases are still among the most widespread health problems in the contemporary world. In rich and poor countries alike, they pose substantial health burdens, ranging in severity from mild indisposition to fatal illnesses (Tracy, 2011)Every year, food borne outbreaks associated with consumption of contaminated foods cause millions of cases and thousands of deaths worldwide, making food borne illness one of the most widespread public health problems in modern society (Cagri-Mehmetoglu,.2009) for example many communicable diseases, including

emerging zoonoses, are transmitted through food, and many other diseases, including cancers, are associated with chemicals and toxins in the food supply. This existing burden will be compounded by the effects of climate change, which is likely to increase the incidence of food borne diseases because of the faster growth rates of microorganisms in food and water at higher temperatures, potentially resulting in higher levels of toxins or pathogens in food (WHO, 2010).Accordingtoetal ,(2010) microbes can enter the food chain at different steps, are highly versatile and can adapt to the environment allowing survival, growth and production of toxic compounds and therefore. recommended to decrease foodborne illness requires the implementation of safe food handling practices and protect themselves by staying away from high-risk choices throughout the entire chain from farm-to-fork continuum with the home food preparer being the last link in this chain also mentioned that the most important practice is washing hands with soap and water before preparing food decreases the risk of foodborne illnesses .The FDA recommends that hands be washed with soap and warm water for at least 20 seconds before and after handling food, especially raw meat(Cagri-Mehmetoglu,2009).In addition , there are critical control points to preventing food-borne illness mentioned in lossaso,2012 such as preventing cross - contamination from the raw products to ready-to eat, using adequate times and temperatures for cooking, avoiding recontamination after cooking by surfaces previously contaminated with the raw meat, and properly chilling and storing meat after cooking . Failure to

fully recognize the symptoms or sources of foodborne disease prevents consumers from taking corrective action, and when consumers mishandle food during preparation, the health community, food industry, regulators, and the media are ultimately responsible. Whether inappropriate temperature control, poor hygiene, or another factor, the error occurs because consumers have not been informed about how to handle food and protect themselves the food safety message has not been delivered effectively. Although acute gastrointestinal diseases are not all foodborne and foodborne diseases do not always result in acute gastroenteritis, food does represent an important vehicle for pathogens causing acute gastroenteritis (Tracy, 2011).(1995) estimated that as much as 70%of diarrhea diseases in developing countries are believed to be of foodborne origin. Also the World Health Organization recognizes that foodborne diseases include a wide spectrum of illnesses which are a growing public health problem worldwide and are a major contributor to illness, compromised nutritional status, less resistance to disease and loss of productivity (Tracy, 2011).

1.3 Knowledge, Attitudes and Practices (KAP) on Food Safety and Foodborne Diseases

A study to assess knowledge, attitudes, and behavior concerning foodborne diseases and food safety issues amongst formal food handlers conducted in

Italy found that the majority of food handlers who had attended a training course had knowledge and a positive attitude toward foodborne diseases control and preventive measures (Tracy 2011). The positive attitude was not supported when asked about self-reported behaviors and when observed during food preparation for practice of hygienic principles (Tracy, 2011) considered food handling personnel play important role in ensuring food safety throughout the chain of food production and storage , although there are also many gaps in food safety knowledge and practices that may result in foodborne diseases according to Eduarda Gomes-Neves*et al.*, (2007) . Food safety experts have identified the most common food-handling mistakes made by consumers at home. These mistakes include serving contaminated raw food, cooking or heating food inadequately, obtaining food from unsafe sources, cooling food inadequately, allowing 12 hours or more between preparation and eating, and having a colonized person handle implicated food or practice poor hygiene. The same factors were identified in mishandling associated with specific pathogens. so the authors suggested that emphasis should continue on improving knowledge and control of foodborne diseases amongst food handlers (*et al*, 2000),these included the perception that unsafe food is a personal health threat, the perception that one could do something about the threat (self-efficacy), and the motivation to maintain good health (Robert *et al* 1993) so recent survey studies pinpointing the need for training and education of food handlers in public hygiene measures and revealed a general lack of knowledge of microbiologic

food hazards, refrigerator temperature ranges ,cross contamination and personal hygiene (Bas *et al:* 2006) .

1.4Impact of Education of Food Industry Personnel in Hygiene Matters

Educational materials may not be effective if they are designed without looking at the worksite social, physical, and environmental factors surrounding the target audience. Food safety education is most likely to be effective when it is designed specifically for the audience (consumers) and the particular hazard of interest (Nieto-Montenegro *et al*.2005) so requires a re-examination of food safety educational messages to conform epidemiological changing of foodborne illnesses and the increase in knowledge concerning emerging foodborne pathogens to ensure that the guidance given to consumers is appropriate for controlling pathogens that are prevalent in the food supply chain (Jevsnik italic, 2008). Also research is needed to establish reliable and valid evaluation measures for five behavioral constructs which are practice personal hygiene, cook foods adequately, avoid cross-contamination, keep foods at safe temperatures, and avoid food from unsafe sources. Evaluation instruments can be tailored to fit specific education programs. If evaluation instruments focus on these five behavior areas, the result will be meaningful evaluation data that can be more easily summarized across food safety education programs for consumers. Lydia.(2001) because at the end of the day the best ways to manage risk of foodborne illness to promote safer handling of food at the

consumer end of the food chain are communication and consumer education Patil*et al.,* (2005). Education of food industry personnel in hygiene matters is recommended for improving safer food handling practices (Tracy 2011).

Media presentations can motivate people to listen and change behavior because consumers need to understand how to protect themselves through kitchen and personal hygiene, including thoroughness and frequency of hand washing, temperature control, and safe food choices such as foods processed by heat or energy pasteurization(Bruhan,1997).Educational material regarding Good Housekeeping Practice should be available to the general public from many sources. Only safety-conscious consumers can become active partners within the food safety circle (jevsniketal 2008).

Chapter two

Materials and Methods

2.1Study area

River Nile is one of the 18states of Sudan. It has an area of 122,123 km² and an estimated population of 1,027,534. It consists of 6 localities Eldamar is the capital city of the state .The state lies between longitudes 32-30east and latitude 16-22 north..

2.2 Subject and methods

A total of 100 consumers were interviewed in the Nile River State randomly selected. A semi-structured questionnaire was administered, the maximum duration of Questionnaire was 12-15 minutes according to comprehend of respondents to questions. Questionnaire was designed to obtain information on demographics of respondents, food safety perceptions, and awareness of food-borne illnesses, contaminants of foods and hazards, sources of food safety information, confidence in food safety authorities, food handling and safetypractices at home. Frequencies table were used to test for correlations between demographic characteristics and knowledge/behaviors of food diseases. Risks of hazardous practices in the home were calculated according to educational, physical, occupational and marital status. All analyses were performed using the frequency.The questionnaire included the following sections: personal characteristics educational level, the method of thawing frozen meat and refreezing , how women cool cooked food , store the leftover , the way of cooling foods , the opinions of the women about the

fridge temperature, method of cleaning the kitchen counter ,the opinions of women about washing hand, how they wash their hands , the state of hand washing,the way women clean their hands after touching raw meat, fish and chicken , the way of washing hands , covering hair , using gloves and aprons while preparing meals.

Chapter Three

Results

The education level of consumers in this study was 33% University, 22% no educational , 18% High, 14% Primary and 13% Secondary(table 1).

Table 1: Frequencyoftheeducationallevelofconsumers

Education Level	**Frequency**	**Percent**
Non school	22	22
Primary	14	14
Secondary	13	13
High	18	18
University	33	33
Total	100	100

Women purchased food at the beginning of shopping 44%about, 41% purchased food at the end of shopping, 13% have no aware and 2% purchase food in the middle of shopping (table 2)

Table 2: Frequencyoftime of women purchasing meat

Time of women purchasing meat		
Time	**Frequency**	**Percent**
At the beginning of shopping	44	44
In the midst of shopping	2	2
At the end of shopping	41	41
Not aware	13	13
Total	100	100

The duration of getting back home was 45% 1h, 25% <30min, 17% 30min and 13% 45min (table 3)

Table 3: Frequencyofwomengetting back home

The duration of their getting back home		
Duration	**Frequency**	**Percent**
1h	45	45
45min	13	13
30min	17	17
Less than 30min	25	25

Total	100	100

The study showed that 41% of the consumers thaw frozen meat on the countere, 25% thaw frozen meat in the refrigerator, 22% thaw frozen meat in a bag of warm water and 12% thaw frozen meat in the microwave oven. (Table 4)

Table4: Frequencyof thawing frozen meat**:**

The method of thawing frozen meat

The method	**Frequency**	**%**
On the counter cocks in the frozen state	41	41
In the refrigerator	25	25
In a bag of warm water	22	22
In the microwave oven	12	12
Total	100	100

In table 5,54% refreeze food sometimes and 46% never refreeze it.

Table5: Frequency of refreezing food:

Refreezing

	Frequency	%
Never	46	46
Sometimes	54	54
Total	100	100

The high percentage that women cooling cooked foodin a large and deep containers (56%), 42% cool it in small and shallow containers and 2% cooling it at room temperature.(Table 6)

Table 6: Frequency of cooling cooked food**:**

How women cool cooked food

	Frequency	%
In a large and deep containers	56	56
In a few small and shallow containers	42	42
At room temperature	2	2
Total	100	100

About 52%of women stored the leftover in a few small and shallow containers, 38% store it in large and deep containers and 10% store it at the room temperature.(Table 7)

Table 7: Frequency of storing the leftover food**:**

store the leftover

	Frequency	**%**
In a large and deep containers	38	38
In a few small and shallow containers	52	52
At the room temperature	10	10
Total	100	100

Most of womencooling food in small containers(40%), 20 cooling food in the pot in which meal was cooked, 20% cool food in a large containers, 14% have no aware and 6% did not cook in excessive amount. (Table 8)

Table 8: Frequency of way of cooling foods

The way cooling food

	Frequency	**%**
In the pot which meal was cooked	20	20
In a few small container	40	40
In a large container	20	20
Does not cooked in excessive amounts	6	6
Not aware	14	14
Total	100	100

The opinions of the women about the fridge temperature was 88% don’t know, 6% 11-15^{o}c, 4% <1^{o}c and 2% 6-10^{o}c**. (**Table 9)

Table 9: Frequency of the opinions of the women about the fridge temperature

The opinions of the women about the fridge temperature

	Frequency	**%**
<1 ^{0}c	4	4
6-10 ^{0}c	2	2
11-15 ^{0}c	6	6
Don’t know	88	88
Total	100	100

The study showed that 47% of the consumers clean the kitchen counter after each using, 36% clean the kitchen counter after every meal and 17% clean it once a day. (Table 10)

Table 10: Frequency of cleaning kitchen counter

Frequency of cleaning

	Frequency	**%**
after each using	47	47.0
after every meal	36	36.0
once a day	17	17.0
Total	100	100.0

The study revealed that 67% of the consumers clean the kitchen counter using warm water and cloth, 12% using warm water with detergent and

cloth, 12% using detergent and bleaching agent and 9% using spray cleaner. (Table 11)

Table11: Frequency of the method of cleaning kitchen counter**:**

The method of cleaning the kitchen counter

	Frequency	%
warm water with detergent and cloth	12	12.0
warm water and cloth	67	67.0
spray cleaner	9	9.0
detergent and bleaching agent	12	12.0
Total	100	100.0

Shown in table12, 70% of the women think that washing hands was very important, 22% think that it is important, 7% think that it was less important and 1% always wash their hand.

Table12: Frequency of the opinions of women about washing hand

The opinion of women about washing hand

	Frequency	**%**
very important	70	70.0
less important	7	7.0
Important	22	22.0
Always	1	1.0
Total	100	100.0

About 87% of women wash their hands using water soap and rubbing hands and 13% wash their hands using hot water , soap and rubbing hand up to wrists. (Table13)

Table 13: Frequency of way women clean their hands**:**

How they wash their hand	**Frequency**	**%**
water soap + rubbing hands	87	87.0
hot water + soap + rubbing hand up to wrists	13	13.0
Total	100	100.0

Fourtypercentage of the women wash their hands after touching raw meat, fish, chicken using with soap and hot water, 34% of the women wash their hands hand after touching raw meat, fish, chicken using water,whereas 25% of the women wash their hands after touching raw meat, fish, chicken using soap and cold water and 1% of the women using gloves.(Table 14)

Table 14: Frequency of way women clean their hands after touching raw meat, fish and chicken:

The way women clean their hand after touching raw meat, fish, chicken	**Frequency**	**%**
with water	34	34.0
with soap and cold water	25	25.0
with soap and hot water	40	40.0
with gloves	1	1.0

Total	100	100.0

Most of women (51%) cover their hair some time, 35% do not cover it and 14% always cover it. (Table15)

Table 15: Frequency of Covering the hair and using gloves and aprons while preparing meals:

Covering hair		
	Frequency	**%**
Always	14	14.0
some time	51	51.0
doesn't	35	35.0
Total	100	100.0

Women had not awareness with using gloves about 83 % of women never use gloves, 14% use gloves some time and 3% always use gloves.(Table16)

Table 16: Frequency of using gloves

Using gloves		
	Frequency	**%**
Always	3	3.0
Never	83	83.0

some time	14	14.0
Total	100	100.0

Sixty seven of women never used aprons, 18% used aprons some time and 15% always use aprons. (Table 17)

Table 17: Frequency of using aprons

Using aprons		
	Frequency	**%**
Always	15	15.0
Never	67	67.0
some time	18	18.0
Total	100	100

Chapter Four

Discussion

The purpose of this study was to determine the consumer's awareness and knowledge to food safety and the relationship between these knowledge and there behaviors. The approach has agreed with Robert etal 1993 that when food is a source of threat on consumers health and safety all action motivate to maintain good health and they absolutely believe can do something about it and those people are more likely to engage in food safety behavior. Also finding that like the other researches according to considerable depot of empirical studies, demographic characteristics of consumers, especially like gender, age and levels of education and income, influence the consumer attitudes towards food safety (Robert it alic.1993;Julie, 1995;Wilcock italic., 2004 and Unison 2007) .But in our results the gender did not have a role to get knowledge about food safety .On the other hand the difference in the localities that's what needs further analysis to find out the root causes and the strength of the association between their food safety knowledge. Also there is no agreement between Julie (1995) and our results becausethat respondents knew proper food handling concepts but did not put those concepts into practice. Therefore, increasing the adoption of safe food handling practices by consumers should become an important aspect for educators in food safety educational programs (Julie 1995). Correctional food handling and storage procedures are essential measures for assuring food safety in the home. Unfortunately, our observation there were numerous factors related to the onset of foodborne illnesses due to inappropriate food safety practices. In most families, there was a lack of correct adherence to food hygiene during both food preparation and storage measures. Improper food storage, undercooking and cross-contamination were specific risk factors for domestic outbreaks of foodborne pathogens which may be responsible for 30% of all salmonella outbreaks in the home (Kagan italic (2002). A review by Redmond and Griffith(2003)analyzing 88 consumer safety studies, underlined that unsafe food-handling practices are still commonly found during the preparation of food in private homes, thus increasing the potential risk of illness from food poisoning. The majority of unsafe food hygiene practices reported in this review were associated with cross-contamination.Another potential risk for foodborne diseases from our study was cross contamination of refrigerated food storage. Behaviors need to be related to keeping foods at safe temperatures and at a proper distance in order to prevent illnesses caused by *Bacillus cereus* and *Clostridium*

perfringens and *Staphylococcus aurous* (Hillers italic. Many participants believed that not necessary to clean and disinfect cutting boards between preparing different foods. In fact they reported that the same cutting board was used for the preparation of raw and cooked food without cleansing the cutting board with soap between uses. Furthermore, they were more likely to use wooden cutting boards, thus increasing the potential risk of cross-contamination. A large number did not believe it was necessary to washing their hands after handling raw meat, poultry or fish. These behaviors are associated with pathogens like *Salmonella* spp., *Campylobacter*spp, *Listeria*spp, *Escherichia coli* O157:H7 and *Yersinia enterocolitica* De Giusti etalic2007; Hillers et al.2003; Redmond and Griffith2003; Scott2001).Most food safety surveys report that a high percentage of individuals, responsible for preparing meals for themselves and other family members, have not been properly informed about food safety procedures, especially towards health risks during preparation in the home (Angelilloet al.2001; Redmond and Griffith2003). Our findings are in accordance with other national and international studies (Angelilloet al.2001; Hillers et al.2003 Oldfield2002; Scott2001; Unusan2007), reflecting a misperception on the risk of contracting foodborne illnesses in the home which remains a critical link for preventing foodborne diseases. Furthermore, our findings confirm that the home environment completes the food safety and food chain pathway and thus, represents an important site for the spread of pathogens responsible for foodborne diseases. This information highlights the lack of knowledge and inadequate behaviors that consumers adopt during food purchase, storage and preparation. Information and educational programs should not be limited to appearance when buying a safe food product.At the moment, it is unlikely that domestic food handling will reach the same level as food safety control in food industry preparation. However, overall safety procedures of food handling, storage and preparation needs to be indicated to consumers. The use of brochures at supermarkets would be useful to underline the danger of the growth of micro-organisms and their link to inappropriate practices including simple guidelines for proper food purchase, preparation, cooking, and storage, which would further reduce such risk. Another simple possibility would be to print websites dedicated to basic concepts of food safety in the home environment directly on grocery bags, or the WHO Five Keys to Safer Food (World Health Organization2009). As suggested by previous studies, media campaigns could be employed because “Media campaigns could be an excellent opportunity for this aim because such information will be received by a large number of consumers even in the home” (Miles it alic . 2004; Unusan2007). Although our results may not be generalized to the

entire Italian population, further studies will be necessary among other groups of consumers in different geographical areas.

Conclusion

The majority of unsafe food hygiene practices observed in this study was associated with lack of knowledge underlining the important need to increase food safety awareness of consumers. The best way to practice food safety is to be well-informed. At the moment, in the state , food science or the fundamentals of food hygiene are not taught sufficiently in schools, the ideal place to begin educational interventions and the above results reinforce the need to provide rules and procedures to guide the consumers who are equally responsible as food industry professionals on ensuring food safety in the home. The established food-safety management system (e.g. HACCP, GHP, GMP) ensures food safety throughout the entire food chain “from farm to table”, but needs to adapt additional measures in order to guarantee correct hygiene and food safety in the home. The practices assessed in this study also indicate that households can provide food safely although attention needs to be given to some practices and regulatory compliance. Training can be regarded as essential to ensure food safety.

Recommendation

1. Regulations regarding the general hygiene of premises and the transportation of foods should be reviewed and strengthened to focus on a risk based approach.
2. Training conducted should focus on an understanding of the rationale for the behaviors as knowledge is not always translated into practices or behaviors.
3. Consumers should make use of the Five Keys to Safer Food behavioral methodology as a guide for training purposes, on principles of good hygiene practices.
4. It is recommended that Nile river state regularly update the database to ensure that it reflects the current situation and not a cumulative total as is currently the case.
5. Modernization of information capturing and inspection can be done with internet based software.
6. The other limitations of the study regarding the lack of exploratory work in this area should be addressed through further studies in this area.
7. Further exploratory studies need to be undertaken to understand the reasons for satisfactory knowledge on food safety.

8. This study shows that there is a need for additional research in the area of consumer and the possible risks they may pose with regard to food safety.

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