Food Safety Knowledge among Women in Selected Areas in Khartoum City

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Abstract: ***Food safety, an increasingly important public health issue refers to the conditions and practices that preserve the quality of food to prevent contamination microbes or toxic chemicals resulting in food borne illness. The aim of the present study was to examine knowledge attitude related to food safety among women responsible for purchasing and preparing food at the home level. 209 women were randomly selected from households from three areas in Khartoum city [Imtidad Naser, Manshia and Giraffe Garp]. Age significantly correlated with the confidence in the safety of poultry, milk and dairy products, while educational level with that of meat, milk and dairy products. It also significantly influenced the purchasing behavior of meat and poultry while educational level that of meat. Age also correlated significantly with the knowledge of some common food borne diseases, food thawing and labeling while educational level with that of food labeling and food borne illness caused by salmonella. Women education on food safety at the home level is advisable.***

Keywords: Food safety, Home preparation, knowledge, women, Khartoum, Sudan

1. Introduction

Food safety, an increasingly important public health issue ((WHO, 2004), refers to the conditions and practices that preserve the quality of food to prevent contamination microbes or toxic chemicals resulting in food borne illness. Food can be already contaminated with microbes, infected during the packaging process or mishandled, improbably cooked or stored {Medeiros et al, 2004. It can also be contaminated by potential undesirable compounds that can be natural i.e. mycotxins, environmental i.e. dioxins, agrochemicals i.e. pesticides etc (Seyfang, 2007).

Most food borne illness is preventable if food protection principles are followed from production to consumption to ensure safety but is practically impossible to apply in developing countries. Therefore, the critical link in the chain should be home food preparation to prevent contamination during its handling, preparation, and storage. Studies showed that consumers have inadequate knowledge about measures needed to prevent food borne illness at the home level (Mederios et al, 2001; Altekruse et al, 1996; Scott, 1996; Bryan, 1988).

In Europe, the home was the most frequent source of infection (WHO, 1992) and studies indicated that sporadic home cases or small outbreaks in homes accounted for the majority of food poisoning incidences (Redmond and Griffith, 2003). Sammarco et al (1997) reported improper thawing of food, inadequate storing and reheating of cooked foods during home food preparation which could possibly be contamination sources. Food safety knowledge tends to increase with age and practice. Females scored higher than males and younger respondents showed the greatest need for additional food safety education (Albert et al, 1995). Brewer et al (2008) reported that the majority of consumers thought that foods genetically modified, irradiated, from animals treated with hormones or antibiotics found safe by the USA Food and Drug Administration were thought safe to eat but one-third would not purchase them, and more than 20% have reduced their consumption of these foods. This indicates that food safety issues depend on personal attitudes and behaviors. Consumer behavior is an individual decision-making process depending on age, occupation, economic status, self-concepts etc. Food labeling is another factor that identifies, describe or promote the food products (Bernues et al, 2003; Teague and Anderson, 1995) hence affects consumers behavior. The objective of this study was to investigate the knowledge and behavior regarding food safety among women responsible for the purchase and preparation of food at the home level.

2. Subjects and methods

Subjects: 209 women were chosen from Imtidad Naser, Manshia and Giraffe areas.

Methods: An interview questionnaire was used to collect information on knowledge and practices conducted by the author during the period August 2005 to December 2006. It covered data on demography, food safety knowledge and food safety purchasing behavior. Data was analyzed statistically using SPSS version 10.0. Frequency and percentages of responses in each category were calculated and presented in tabular form. Analysis using chi square and bivariate correlation tests were conducted to investigate the relationship between consumers' demographic variables and food safety knowledge.

Results:

Demographic data:

The demographic characteristics of the 209 female respondents were: age range (25→≥60 years old), 88.5% married, 6.7% single and 4.8% divorced. Educational levels were 15.8% ≥ University, 74.6% high secondary and 6.7% primary education.

Attitude toward food safety:

Respondents were asked about their opinion on the safety of certain food categories. Their confidence was 47.7% in meat, 41.6% in fish, 33.5% in milk and their products, in

addition to 21.5% in poultry and only 9.1% in canned foods (Table 1).

Age had a significant effect in the confidence on the safety of poultry (P=0.003), the age group most affected was 31—40 years old (Table 2). Similarly for milk and its products (P=0.000), the age group most affected was the 41-50 years old (Table 3).

Educational level was significantly related to the confidence in the safety of meat and its products (P=0.007); those with ≥ university education (72.2%) were the most affected (Table 4); similarly for milk and its products (P=0.001), those most affected had primary education (Table 5). However, the relationship between the level of education and confidence in the safety of poultry (Table 6) was not significant (P=0.06).

Table 1: Attitude towards food safety

Parameters	*Level of confidence in food items*									
	Canned foods		*Meat and meat products*		*Fish and products*		*Poultry*		*Milk and milk products*	
	Freq.	%	Freq	%	Freq	%	freq	%	Freq	%
Confidence in food safety	19	9.1	100	47.7	87	41.6	45	21.5	70	33.5
Not confidence in food safety	160	76.6	51	24.4	79	37.8	90	43.1	63	30.1
Have no idea about	30	14.4	58	27.8	43	20.6	74	35.4	76	36.4
Total population	=209									

Table 2: Age /poultry safety

Age years	*Safe*	*%*	*Unsafe*	*%*	*Don't know*	*%*	*Total*	*%*
25-30	1	16.7	0	0	5	83.3	6	100
31-40	14	51.8	7	25.9	6	22.2	27	99.9
41-50	22	29.3	33	33.4	20	26.7	75	100
51-60	8	8.8	42	46.1	41	45.1	91	100
60+	0	0.0	8	80.0	2	20.0	10	100
Total	45	21.5	90	43.1	74	35.4	209	100

P value =0.00

Table 3: Age/ milk and dairy products safety

Education	*Safe*	*%*	*Unsafe*	*%*	*Don't know*	*%*	*Total*	*%*
25-30	6	100	0	0.0	0	0.0	6	100
31-40	7	25.9	13	48.1	7	25.9	27	100
41-50	37	49.3	15	20.0	23	30.7	75	100
51-60	19	20.9	32	35.1	40	43.9	91	99.9
60+	1	10.0	3	30.0	6	60.0	10	100
Total	70	33.5	63	30.1	76	36.4	209	100

P value =0.00

Table 4: Education and meat safety relationship

Education	*Safe*	*%*	*Not safe*	*%*	*Don't know*	*%*	*Total*	*%*
Primary	12	60.0	2	10.0	6	30.0	20	100
Secondary	64	41.0	47	30.1	45	28.8	156	99.9
≥University	24	72.7	2	6.1	7	21.2	33	100
Total	100	47.8	51	24.4	58	27.8	209	100

P value =0.007

Table 5

Education	*Safe*	*%*	*Unsafe*	*%*	*Don't know*	*%*	*Total*	*%*
Primary	10	50.0	6	30.0	4	20.0	20	100
Secondary	54	36.4	37	23.7	65	41.6	156	100
≥University	6	18.1	20	.606	7	21.2	33	99.9
Total	70	33.5	63	30.1	76	36.4	209	100

P value: 0.001

Table 6: Education and safety of poultry relationship

Table. 8 Parameters	*Safe*	*%*	*Unsafe*	*%*	*Don't Know*	*%*	*Total*	*%*
Primary	5	25.0	8	40	7	35.0	20	100
Secondary	29	18.58	66	42.3	61	39.1	156	100
University	9	33.3	15	55.5	3	11.1	27	100
University +	11	33.3	16	48.5	6	18.1	33	99.9
Total	45	21.5	90	43.1	74	35.4	209	100

P value: 0.06

Purchasing behavior:

Respondents were asked about less purchased foods and to indicate the reasons for such behavior (Table7). Less meat was bought by 32.5% because of its high price (64.6%), concern about microbial count (29.4%) or its fat content (5.9%). 63.6% bought less fish due to its high price (64.6%) or concern about its microbial count (35.3%). Similarly less egg was bought because of the high cholesterol content (59.1%) and price (28.1%). Less chicken was purchased because of the high price (51.2%) and microbial count (48.8%).

Leading factor for less purchase of fruits and vegetables was pesticides contamination (39.6%). Respondent's opinion about food condiments was: 51.5% had no idea while 39.7% thought such compounds cause health problems. Relationship between age and the purchase of less fish (Table8) was significant (P=0.002); most of those who stated safety measures (51%.7%) aged 51-60 years while high price was claimed by 76.7% of the 41-50age group. Similarly, there was a significant relationship (P=0.000) between age and the purchase of less poultry (Table 9): safety measures was claimed mostly (36.3%) by 41-50 years old while high price by 59.8% of the 51-60 age group.

No significant relationship was obtained between educational level and neither the purchase of less meat (P=0.34) nor of food condiments (P=0.22) as shown in Tables 10 and 11.

Table 7: Less food items purchase

Food	*Bought by*	*Reasons (%)*				
		Price	*Safety*	*Cholesterol*	*pesticides*	*quality*
Meat	68(32.5%)	64.6%	29.4%	5.9%	-	-
Fish	133(63.6%)	64.6%	35.3%	-	-	-
Poultry	209(100%)	51.2%	48.8%	-	-	-
Eggs	71(33.9%)	28.1%	12.7%	59.1%	-	-
Fruits/vegetables	91(43.5%)	23.0%	29.7%	-	39.6%	7.7%
	Bought by	No knowledge	Health problem	Don't like its taste		
Food condiments	68(32.5%)	51.5%	39.7%	8.8%	-	-

Table 8: Age and purchasing less fish

Parameter	*Safety measures(microbial)*	*%*	*High price*	*%*	*Total*	*%*
25-30	6	4.5	0	0.0	6	4.5
31-40	8	6.0	19	14.0	27	20.3
41-50	4	3.0	66	49.6	70	52.6
51-60	29	21.8	1	0.75	30	22.6
Total	47	35.3	86	64.35	133	100

P value =0.002

Table 9: Age and purchasing less poultry

Parameters	*Safety Measures (Microbial)*	*%*	*High Price*	*%*	*Total*	*%*
25-30	6	2.9	0	0.0	6	2.9
31-40	23	11.0	4	1.9	27	12.9
41-50	36	17.2	39	18.7	75	35.8
51-60	27	12.9	64	30.6	91	43.5
>=61	10	4.8	0	0.0	10	4.8
Total	102	48.8	107	51.2	209	100

P value =0.000

Table 10: Education and purchasing less meat

Parameters	*Fat Content*	*%*	*Safety Measures (Microbial)*	*%*	*High Price*	*%*	*Total*	*%*
Primary	0	0.0	1	1.5	4	5.9	5	4.7
Secondary	1	1.5	10	14.7	34	50.0	45	66.2
University	0	0.0	9	13.2	6	8.8	15	22.1
University +	3	4.4	0	0.0	0	0.0	3	4.4
Total	4	5.9	20	29.9	44	64.7	68	100

P value =0.34

Table 11: Education and purchasing less condiment

Parameters	*No knowledge about food additives*	*%*	*Cause health problems*	*%*	*Its taste not good*	*%*	*Total*	*%*
Primary	0	0.0	1	1.5	2	2.9	3	33.0
Secondary	34	50.0	17	25	4	5.9	55	80.9
University	1	1.5	7	10.3	6	0.0	8	11.8
University +	0	0.0	2	2.9	0	0.0	2	2.9
Total	35	51.5	27	39.7	6	8.8	68	100

P value =0.22

Food Safety Knowledge:

That certain diseases are caused by contaminated food was known by 51.9% of the respondents (Table 12).These included gastrointestinal diseases (79.9%), cholera (61.2%), salmonella (36.4%) and hepatitis A (30.1%). Most respondents (72.2%) admitted the need of hand washing before food preparation to reduce causes of food poisoning (Table 13). Other sources mentioned were reheating of food (34%) and preparation of food in advance (23%). Measures mentioned to assure food safety were watching of food label (51%) mainly production and expiry dates (77.6%) but only 28.7% disposed expired packed food. Thawing of frozen food was mostly (77.6%) carried out at room temperature and only 10.0% used the refrigerator.

Correlations between knowledge on food safety and age or educational level are shown in Table 14. Significant correlations were found between age and knowledge about cholera (R=0.296**, P=0.000), hepatitis A (R= 0.213**, P=0.002), salmonellae (R=0.151*, P=0.029), throwing food at its expiry date (R=0.221**, P=0.001) and food labeling (R=0.236*, P=0.014). Educational level was significantly correlated with knowledge about food label (R=0.210**, P=0.000) but was marginally correlated with knowledge about salmonellae infection (R=0.137*, P=0.049). Mass media was the main (64.6%) source of information about food hygiene.

Food safety knowledge:

Table 12: Knowledge about food borne diseases

Parameter	*Cholera*	*%*	*Hepatitis A*	*%*	*Gastrointestinal*	*%*	*Salmonella*	*%*
Yes	128	61.2	63	30.1	167	79.9	76	36.4
No	81	38.8	146	69.9	42	20.1	133	63.6
Total	209	100	209	100	209	100	209	100

Table 13: Food safety knowledge

Practice	*Yes*	*%*	*No*	*%*	*Don't know*	*%*		
Preparation of food in advance contributes to food poisoning	48	23.0	60	28,7	101	43.7	209	100
Hand gloves for hygiene	44	21.1	-	-	165	87.9	209	100
Discharge of expired packed food	60	28.7	134	55	15	16.3	209	100
Reheating of food	71	34.0	56	26.7	82	39.2	209	100
	Yes		No		occasionally			
Hand washing before preparing food	151	72.2	12	5.7	46	22.0	209	100
Concern of food labeling	107	51.2	29	13.9	73	43.9	209	100
Source of information of food safety	Mass media		Course of food safety		No where			
	135	64.6	61	29.2	13	6.2	209	100

Table 14: Correlation between food safety and some Demographic variables

Table .12.Correlation	*Knowledge on*	*R*	*P*
Education	Salmonellas	0.137*	0.049
Education	Knowledge about food label	0.210**	0.000
Age	Cholera	0.296**	0.000
Age	Hepatitis A	0.213**	0.002
Age	Salmonellas	0.151*	0.029
Age	Throwing food at its expiry date	0.221**	0.001
Age	Food labeling	0.236*	0.014

3. Discussion

This study provides information and reveals many features about the knowledge, attitudes and practices of food safety among consumers in the three areas selected in Khartoum city.

Attitude:

Attitude towards food safety was: less than half the respondents had confidence in the safety of meat, fish, milk and their products and only one fifth in poultry. This confidence was related to age (31-50 years old) and to educational level (≥ University and primary) for meat and milk and their products.

Age was significantly related to the confidence in the safety of poultry and milk and its products; the highest rate was among the 31-40 age groups in the former and the 41-50 groups in the later. Contrary to Miles (2004) who stated that confidence in food safety increased with age, this study found that it decreased with increasing age for poultry and no definite pattern was observed for milk and its products.

Confidence in the safety of meat and its products was more prevalent among women with ≥ university education followed by those with primary education: this may be attributed to the fact that those with primary education had accumulated traditional experience in their attitude towards food safety as is also shown by their attaining the highest rate in their confidence in the safety of milk (the most easily spoiled food). Those with university education had more access to knowledge on food safety regarding meat but their low confidence in milk safety was rather strange.

Purchasing behavior:

Respondents purchased less meat, fish and poultry the main reason was concern about price as these are the most expensive food items in Khartoum State. Half the respondents purchased fewer eggs, because of its cholesterol content. Nowadays, the link between cholesterol and heart diseases is common knowledge. Eggs consumption is low in Sudan (FAO, 2005) which is

typical in developing countries as it is consumed by the few most affluent (Elkin, 2007).

Less than half the respondents purchased less fruits and vegetables, for fear of contamination with pesticides' residues which are harmful to the body (Keifer, 1997). However, about 28% mentioned high price probably unaffordable to many due to the seasonality nature of the produce.

Half of the respondents who bought less condiment had no information about their safety while 40% believed they were bad for health. Condiments e.g. ketchup, monsodium glutamate etc can contribute to unhealthy effects (Khairunnisak, 2009).

Knowledge:

About three fourth of the consumers washed their hands before preparing food, Reports indicated that the simple act of washing hands with soap and water reduces the incidence of diarrhoea from shigella and other causes by up to 35% (WHO, 1999). In a national Australian food safety telephone survey, most people (82.3 %) washed their hands with soap or detergents and 81.6 % felt it was very important to wash hands before and after preparing meals (Jay et al, 1999). Some respondents in this study used gloves to minimize transmission of diseases. Montville et al (2001) indicated that proper glove use can decrease the transfer of pathogens from hands to food but Guzewich and Ross (1999) reported that glove use may promote poor hand washing practices.

Significant correlations were found between age group and knowledge of food borne diseases (cholera, hepatitis A and salmonellae). Gastrointestinal diseases were perceived as health problems by most of the respondents even though they were thought as normal incidents. An average of 68% of the respondents were not aware that salmonella and hepatitis A cause food borne illnesses especially salmonella transmitted through the oral fecal route (Zhang et al (2005).

Most of the respondent got their information from the mass media. Media can reach many consumers in their homes. It can be beneficial in health education and could provide "cues to action" helping to improve domestic food hygiene. Different components of the mass media provide salient information that increases top-of-mind awareness of the hazards (Tetlock, 2007). Written educational materials can provide a good opportunity to focus on all food safety practices because they provide educators with more space to explain the growth of microorganisms and their link to inappropriate practices.

Food safety information should be age-specific, school-based, and reinforced through classes. Media campaigns and videotapes can also provide an excellent opportunity to focus on food handling, cooling and thawing practices. USDA-FSIS (2002) reported that consumers were more knowledgeable about food safety, but their knowledge was not always reflected in their food handling behaviors when they were observed. Half of the consumers in the present study knew the importance of food labeling and were aware that food labels with written expiry dates give confidence in the safety of the product. However, other information on food label e.g. list of ingredients, country of origin etc were less frequently read.

Most respondents (87.1%) thawed frozen foods at room temperature, while 10 % used refrigeration and only 2.9% used other methods i.e. microwave oven; thus they were unfamiliar with the correct procedure for thawing of foods. There are four safe thawing methods: in refrigerated units at $\leq 7°C$; under portable running water at $\leq 21°C$ followed immediately by cooking; in a microwave oven only when the food will be immediately cooked afterwards and as part of the regular cooking process (NRA, 1995 and 2002).

4. Conclusion

The results from this study indicated the need for food safety education in this target group.

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