



## Role of the Rural Women Schools in Raising the Participants Awareness Towards Food Safety, Gezira State, Sudan

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### ABSTRACT

The role of rural women schools (RWS) in Sudan, mainly focus in the agricultural development, thus contributing to agricultural productivity, farmer incomes increase and improvement of the quality of life in rural areas. Food safety is also a key contributor to agricultural development and food security. Objective of this study is to assess the role of the RWS in raising the women awareness towards food safety in Gezira State, Sudan. Data were collected through a structured, closed ended questionnaire. Questions were designed according to the triple Likert scale. A purposive sample was selected; 54 women were previously participated in the trainers session on food safety in RWS was selected from the study area. On the other hand, 52 women were selected randomly as non-participant women. All data were statistically analyzed with SPSS program. The results of the study revealed that, the awareness level towards food safety among the trained women was moderate, where the average weighted mean of the responses of the respondents to the questionnaire statements was (2.00). On the other hand, the average weighted mean of the responses of the untrained women was a little bit less than trained women, which was (1.85). The t-test statistics indicated that there is no significant difference at 0.05 significance level between the weighted means of the responses of both trainers and un-trainers towards the questions of the study. These findings were rather disappointing because it showed that, the training which done by the RWS was not succeeded in raising the level of awareness as expected. The study recommended that, the content of the training and the teaching methods used should be revised carefully.

### KEYWORDS:

*Food safety, Awareness, Rural Women, Practices, Sudan*

## INTRODUCTION

Food safety has been a human health issue since history and many food safety problems encountered today are not new. Although governments all over the world are doing their best to improve the safety of food supply, the occurrence of foodborne disease remains a significant health issue in developing countries. It has been estimated that, each year about 1.8 million people die as a result of diarrheal diseases and most of these cases can be attributed to contaminated food or water (WHO, 2006). The occurrence of foodborne diseases is mainly attributed to basic errors in food preparation or handling either at home or in food service establishments, (Mwamakamba *et al.*, 2012).

Agricultural extension is among the most important policy instruments that governments can use in the agricultural development, thus contributing to agricultural productivity and farmer incomes increase and quality of life improvement in rural areas.

In Sudan, the Farmer's Schools was developed and introduced in 1993 as a part of IPM program as an extension tool, (Igbal, *et al.*, 2016). For the women farmers, the Rural Women Schools (RWS) was established in 1995 in order to promote the women skills in agricultural production and food security. Accordingly, a specific syllabus has been made to meet these objectives, (El Makki, 1998). The RWS aim to find a woman who is expert in managing her home, and who is able to rely on herself and help her family by participating in agricultural work. This syllabus was designed according to the woman's work and her strategic needs. Therefore, in addition to many other topics such as income-generating projects and health education, the syllabus composed training classes in food industries, nutrition, and environment preserving methods, (Abdel Raouf, 2014).

The history of the RWS in Gezira State began in the Gezira Scheme since the beginning of the farmer's schools in 1993 through the Integrated Control Project of FAO which implemented to raise the productivity of the scheme. The implementation of the program was done by the Agricultural Extension Department. The number of schools reached 15 schools distributed over the project departments, then the number of schools increased to 30 schools distributed over the seven localities of the state. According to the statistics of the Ministry of Agriculture until 2014, the number of the trainees reached about 1488 women, (Abdel Raouf, 2014).

### **Objective of the study**

The overall objective of this study is to assess the role of the rural women schools in raising the women awareness towards food safety practises including cleanness, cooking, purchasing, preservation, and the safe sources of the water and raw food.

## Variables of the study

1. Scio-economic characteristics
2. Food safety keys (Practices and attitudes): cleaning, cooking, temperature control, cross contamination and Safe sources of water and raw food.

## MATERIALS AND METHODS

This study was conducted in South Gezira locality in Gezira state, Sudan in the period March – April 2022. Depending on the objective of the study the data were obtained by a purposive sampling by selecting 54 trained women on food safety in RWS in the study area. For the purpose of comparison, another 52 women were selected randomly from untrained women. Data were collected through a structured, closed ended questionnaire. Twenty-eight questionnaire questions were developed in order to measure the attitudes and behaviour of the women regarding food safety. The three points Likert scale, (Always = 3, sometimes =2, never = 1) were used, in which points were given to the responses of the questions according to the frequency of doing the best food safety practices that specified in the questionnaire. Descriptive statistics such as means, percentages, in addition to t-test, were applied for data analysis. Weighted mean was used as it was defined by Robert and James (1980) as:

$$Y_w^- = \frac{\sum w_i Y_i}{\sum w_i}$$

Where:

$Y_w^-$  : Weighted mean

$Y_i$  :  $i^{\text{th}}$  observation

$W_i$  : weight of  $i^{\text{th}}$  observation

For testing the statistical differences between the weighted means, the value of t-test was calculated according to following formula:

$$t = \frac{Y^- - \mu}{S_{Y^-}}$$

Where:

t : The value of the t statistics

$Y^-$  : sample mean

$\mu$  : population mean

$S_{Y^-}$ : Standard deviation

## RESULTS AND DISCUSSION

## 1. The socio-economic characteristics of the respondents

Table1: Socio-economic characteristics of the respondents

Item	Categories	Non-participants		Participants	
		Freq.	%	Freq.	%
Age /years	< 25	30	57.70	12	22.2
	26 - 36	21	40.40	28	51.9
	37 - 48	01	01.90	12	22.2
	> 48	00	00.00	02	3.70
	<b>Total</b>	<b>52</b>	<b>100.00</b>	<b>54</b>	<b>100.00</b>
Marital status	Married	07	13.50	07	13.0
	Unmarried	13	25.00	13	24.0
	Widow	06	11.50	12	22.2
	Divorced	26	50.00	22	40.7
	<b>Total</b>	<b>52</b>	<b>100.00</b>	<b>54</b>	<b>100.00</b>
Educational level	Illiterate	03	5.80	02	03.70
	<i>Khalwa</i>	03	5.80	14	25.90
	Elementary	24	46.20	13	24.10
	Intermediate	11	21.20	13	24.10
	Secondary	05	09.60	05	09.30
	University	06	11.50	06	11.10
	postgraduate	00	00	01	01.90
	<b>Total</b>	<b>52</b>	<b>100.00</b>	<b>54</b>	<b>100.00</b>
Family size (persons)	Small (2 -5)	00	00	06	11.10
	Moderate ( 6 – 10)	18	34.60	19	35.20
	Large $\geq$ (11)	34	65.40	29	53.70
	<b>Total</b>	<b>52</b>	<b>100.00</b>	<b>54</b>	<b>100.00</b>
Occupation	Farmer	08	15.40	21	38.90
	Employee	19	36.50	14	25.90
	House holder	20	38.50	17	31.50
	Merchant	05	09.60	02	03.70
	<b>Total</b>	<b>52</b>	<b>100.00</b>	<b>54</b>	<b>100.00</b>
Monthly income /SDG	20000 - 50000	14	26.90	21	38.90
	51000 - 70000	24	46.20	18	33.30
	71000 - 100000	07	13.50	13	24.10
	> 100000	07	13.50	02	03.70
	<b>Total</b>	<b>52</b>	<b>100.00</b>	<b>54</b>	<b>100.00</b>

\*Source: Field survey (2022).

Table 1 summarizes the socio-economic characteristics of the respondents in the study area. According to the results, the majority of the non-participants (57.7%) were fell in the age group < 25 years while more than 50% of the participants their ages between 26-36 years. High percentages of divorce were obtained as 50% and 40.7% for the non-participants and the participants, respectively. Most of the non-participants (46.2%) were completed their elementary education, and about 75% of the participants were Khalwa, elementary, and intermediate graduates. The low educational level of both groups is attributed to low economic income. Most of the families are large household sizes (>11 persons). About 38% of the participants were farmers and householders, respectively. Both the participants and non-participants were low income households. These result are close to finding by Bektas, *et al.* (2011) who studied the level of consumer awareness about food safety in Izmir Turkish province, reported that people with high income and education as well as the presence of elderly individuals in the house increase the probability of having knowledge on food safety. According to Al-Jaberi, *et al.* (2023) in Jordan, where their study aimed to survey to investigate the knowledge, attitudes, and practices (KAP) of women food handlers in Jordan. The correlations between participant’s total food safety KAP scores and education, age, experience, region, and the pandemic effect on food safety were statistically significant ( $P \leq 0.05$ ).

**2. Food safety keys**

**2.1. Keep clean key (Practices and attitudes towards kitchen and personal cleanness):**

**Table 2: The weighted mean of the frequencies of the responses towards keep clean key**

Cleaning practices statement	Frequencies of the responses							
	Participants				Non-participants			
	3	2	1	W.M	3	2	1	W.M.
- I do not allow home animals to enter the kitchen	17	18	19	1.96	22	18	12	2.19
- I keep cut the meat by a separate knife	8	28	18	1.81	14	17	21	1.87
- During shopping I care about the cleanness of the place of selling and vegetables, fruits, and meat seller	13	27	14	1.98	16	27	10	2.10
- I keep washing my hands before food preparation	14	24	16	1.96	22	24	06	2.31
- I keep the kitchen clean	17	22	15	2.04	21	21	10	2.21
-I use to cut my nails every week	14	26	14	2.00	14	26	12	2.04
- I keep washing kitchen towels by using water & soap	15	24	15	2.00	19	18	15	2.08
<b>Average weighted mean</b>	1.94				2.11			

W.M.: Weighted mean

Weights of the responses: Always = 3, Sometimes = 2, Never= 1

Source: Authors’ computation (2022)

Based on table 2, the average weighted mean of the responses of the respondents of the study was less than the average (2) for the participants and a little bit more for the non-participants. This indicated that, the women either they did not benefit from the training or this part did not be covered within the training materials. The calculated t-test (0.02832) was less than the tabulated (2.447) indicating that, there is no significant statistical difference between the two weighted means at 0.05 level of significance.

This study was nearly close to Sikder study in (2020) in *Jaintapur Upazila* province, Bangladesh, where his study aimed to assess knowledge, attitude and practice of personal hygiene among selected rural people. Almost (94.2%) of studied people are washed hand before eating, (96.8%) washed their hand after coming back from the toilet and (97.7%) respondents had habit of cutting nail. Majority of them (78.5%) used soap for hand washing after coming back from latrine, only (0.3%) used liquid hand wash and others respectively. More than half of respondents got information about food safety, from radio and television, (25.6%) from health educator and (5.5%) from others. According to Al-Jaberi, *et al.* (2023) in Jordan, where their study aimed to survey to investigate the knowledge, attitudes, and practices (KAP) of women food handlers in Jordan. The respondents demonstrated high knowledge, attitudes, and practices in the personal hygiene, cleaning and sanitation areas ( $\geq 60.0\%$ ). Mojca, *et al.* in (2022) in Slovenia, where their study aimed to identify consumer’s food safety knowledge, practices, and hygiene status in the observed home kitchens. The kitchen surfaces exceeded the recommended limits for 25% of consumers and statistical differences in RLU and TCC levels on surfaces between older and younger consumers were not observed, although all (25%) inadequately cleaned kitchens belonged to older consumers.

**2.2. Cook thoroughly key:**

**Table 3: The weighted mean of the frequencies of the responses towards cook thoroughly key**

Cooking practices statement	Frequencies of the responses									
	Participants				Non-participants					
	3	2	1	W.M	3	2	1	W.M.		
- I leave the food on fire for 15 minutes after boiling	1	4	31	9	2.09	07	21	24	1.67	
- I use to cover the cooking Powel immediately after I finish cooking.	1	1	27	16	1.91	02	23	27	1.52	
<b>Average weighted mean</b>					2.00					1.60

W.M.: Weighted mean

Weights of the responses: Always = 3, Sometimes = 2, Never= 1

Source: Author’s computation (2022)

As table 3 shown, the value of the average weighted mean indicated that the participants were better in cooking practices than the non-participants, where it was 2.00 compared to 1.60, respectively. But when testing this difference between them by comparing the calculated t-test to the tabulated, it become obvious that the difference is not significant, where the tabulated  $t = 12.706$  was more the calculated (0.07445) at 0.05 level of significance. According to Al-Jaberi, *et al.* (2023), finding, participants' knowledge, attitudes, and practices regarding contamination prevention, health issues that would affect food safety, symptoms of foodborne illnesses, safe storage, thawing, cooking, keeping, and reheating of foods, as well as COVID-19 were all low (< 60.0%). In contrast of present study compare to a study conducted by Makafui and Nicolas, (2023) about urban households' awareness toward food safety in Ghana, the study sought to answer the primary research questions, including; the main factors that influence urban households' choice of food markets and the effect of household food safety knowledge and wealth status on food safety cooking practices/behavior. In addition, although households are food safety knowledgeable and have a positive attitude towards food safety, neither food safety knowledge nor attitude has a statistically significant effect on food safety cooking practices/behavior. However, household wealth status positively affects food safety cooking practices/behavior.

### 2.3. Use safe water and raw materials key

**Table 4: The weighted mean of the frequencies of the responses towards use safe water and raw materials key**

Safe sources statement	Frequencies of the responses								
	Participants				Non-participants				
	3	2	1	W.M	3	2	1	W.M.	
- When purchasing red meat, I keep checking the presence of the stamp on it.	17	26	11	2.11	10	21	21	1.79	
- I keep purchasing fruits and vegetables from a familiar one for me.	10	34	10	2.00	17	22	13	2.08	
- I use tap water for cooking, drinking, and washing the fruits and vegetables.	14	25	15	1.98	12	23	17	1.90	
- I keep saving cooking and drinking water in special tanks.	17	22	15	2.04	13	22	17	1.92	
<b>Average weighted mean</b>					2.03				1.92

W.M: Weighted mean

Weights of the responses: Always = 3, Sometimes = 2, Never= 1

Source: Authors' computation (2022)

In table 4 it was although, there was a difference in the values of the weighted means of the two groups, but the t-test showed that there was no statistical difference between the two means, where the calculated t-test = 0.14817 and the tabulated t-test = 3.182 at 0.05 significance level, and this means the two categories under the research indifferent in safe sources of water and raw materials. The WHO estimated that contaminated food causes almost 600 million disease cases and 420,000 deaths annually worldwide due to bacteria, viruses, parasites, poisons, and chemicals (WHO, 2022). In addition, the Eastern Mediterranean has the third-highest rate of foodborne diseases per capita linked to preparing food with contaminated water, poor hygiene and inadequate conditions in food preparation and storage, lower levels of literacy and education and insufficient food safety knowledge or implementation of relevant regulations (WHO, 2022). The WHO’s five keys to safer food is a manual used to evaluate food handler’s knowledge, attitude and behavior towards their cooking practices. The core themes of the five keys to safer food are: keep clean; separate raw and cooked; cook thoroughly; keep food at safe temperatures; and use safe water and raw materials.

**2.4 Keep food at safe temperatures key:**

**Table 5: The weighted mean of the frequencies of the responses towards keep food at safe temperature key**

Control temperatures statement	Frequencies of the responses							
	Participants				Non-participants			
	3	2	1	W.M	3	2	1	W.M
- I keep to put the cooked food in the refrigerator after it gets cold.	17	23	14	2.06	14	19	14	1.90
- I keep washing fruits and vegetables and put them in the refrigerator.	14	22	18	1.93	08	25	19	1.79
- I keep putting the meat in the refrigerator after washing it.	21	17	16	2.09	10	23	19	1.83
<b>Average weighted mean</b>				2.03				1.84

W.M.: Weighted mean

Weights of the responses: Always = 3, Sometimes = 2, Never= 1

Source: Authors’ computation (2022)

The result in table 5 revealed that, the weighted mean of the responses of the participants was more than the weighted mean of the non-participants. Based on t-test, the calculated t (0.03385) was less than the tabulated t (4.30) providing that there was no statistical significant difference between the two means at 0.05 level of significance, which means the two categories under investigation have similar responses in controlling safe temperature of food. Many studies identified improper cooking, temperature abuse during food storage, cross-contamination between cooked and uncooked foods, poor sanitation and hygiene, and using unsafe water and raw materials are the handling factors associated with food-borne disease outbreak and directly linked to food handlers (Mahmood, *et al.*, 2017; Ababio and Lovatt, 2015). Similarly, these findings are consistent with Idris and Immanuel, (2017) who found all the respondent answered do not know in the study. The findings are consistent with many studies which found that respondents had insufficient knowledge on time-temperature controls may have effect on food safety as temperature is also the critical control point in food production (Akabanda and Owusu 2017; Mohd. *et al.*, 2015).

## 2.5 Food purchasing practices and cross contamination key:

**Table 6: The weighted mean of the frequencies of the responses towards food purchasing practices and cross contamination key**

Shopping practices statement	Frequencies of the responses							
	Participants				Non-participants			
	3	2	1	W.M	3	2	1	W.M
- I check the expire date of food products when shopping.	14	25	15	1.98	05	19	28	1.56
- When shopping, I purchase fruits, vegetables, and meat from those which are on clean table.	18	24	12	2.11	20	19	13	2.13
- I keep purchasing fruits and vegetables during their production season.	11	27	16	1.91	08	26	18	1.81
- I use to put the meat in a separate case, when shopping.	15	23	16	1.98	07	19	26	1.63
<b>Average weighted mean</b>	2.00				1.78			

**W.M.:** Weighted mean

**Weights of the responses:** Always = 3, Sometimes = 2, Never= 1

**Source:** Authors' computation (2022)

The value of the weighted mean of the responses of the participants group apparently more than that of the non-participants but their result difference was not statistically different according to the t-test in which the tabulated t was equals to 3.182 while the calculated is 0.34237 at 0.05 level of significance, which means that training in the field of food safety is not reflected in the practices of rural women in the field of safe food during the shopping and preventing cross-contamination during it. According to Al-Jaberi, *et al.*, (2023), finding one thousand one hundred twenty-six respondents completed a food safety questionnaire during the COVID-19 pandemic, with a mean score of 22.1 points out of 42, the results showed that women who handle food in their houses had insufficient knowledge, negative attitudes, and incorrect practices concerning food safety. In contrast of present study compare to a study results according to Makafui and Nicolas, (2023) showed that convenience (proximity and availability of all products at one location) is the primary consideration for choosing a food market, not food safety. Only 18% of respondents considered food safety one of their topmost priorities in choosing a market.

## CONCLUSIONS

Based on the findings of this study, it can be concluded that the training in rural women schools about food safety did not succeeded in making a differences in the food safety knowledge and practices between the participants and the non-participants under the research. So the participants' attitudes and behaviors towards food safety did not changed positively comparing to the non-participants. We conclude that household food safety cooking behavior may improve when households are economically better off, have a higher educational level as well as appropriate food safety knowledge.

## RECOMMENDATIONS

1. Designing a series of sequential training programs to a raise up the awareness of rural women in the field of food safety.
2. Using radio and other social media, in implementation of the training program.
3. Design a proper timetable for training programs that suits rural women's time.
4. Designing of school training programs according to rural women needs.
5. Considering the appropriate location of rural women's training schools, for all participants.
6. Moral and financial support have to be available for all participants.
7. Motivate rural women to wards effective participation in the training program.

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