

## Consumer Food Safety Awareness and Knowledge in Nigeria

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### Abstract

Consumer knowledge of food safety and awareness of hazards in food is important in reducing the prevalence of foodborne diseases. The objective of this study is to identify some of the risky eating habits and determine the level of awareness about food safety of consumers in Nigeria. One hundred survey questionnaires were randomly distributed to consumers in Iwo, Osun State and Lagos State between Feb-March 2013. The responses of 87 respondents were analyzed using descriptive and nonparametric statistics. The results showed that 100% of the respondents eat outside of their homes regularly. Most consumers preferred covered restaurants but 14% eat in bukas (open canteen) and street vended foods. About 30% eat with their fingers and or cutlery. About 91.5% and 96.5% wash hands with soap before and after eating. Over 51% consume raw unpasteurized milk, 61% drink borehole/well water and 85% eat suya. 68% of the respondents said they were familiar with the health implications of suya consumption and also with foodborne pathogens. There were statistical associations between gender, age, level of income, marital status, risky eating habits and awareness of food hazards. These findings show that although consumers may know about hazards in foods, the knowledge has not translated to changes in eating behavior therefore campaigns should be targeted at improving food safety education in Nigeria.

**Key words:** food safety, consumer risky habits, awareness of hazards in food, raw milk, suya

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### Introduction

Foods are consumed in order to provide nutrients to the individuals and are perceived by consumers to be wholesome and unadulterated. Microbiological assessments of foods in Nigeria particularly street vended foods have been demonstrated to be problematic (Ajayi and Oluwoye 2014; Ackah et al. 2011). Commonly purchased restaurants, street vended stationary canteen (buka) and hawked foods are ready to eat meals, snacks, beverages and consumed without further processing. The prevalence of foodborne pathogens in foods consumed in Nigeria is alarming and of public health concern (Ogbonna et al. 2012; Uzeh et al. 2006). Although the middle income developing country is teeming with over 170 million individuals, there is no concrete information as to the number of people who suffer from foodborne diseases after consuming adulterated foods. Many cases of foodborne diseases go un-reported, because food poisoning symptoms are mistaken for other ailments such as malaria (British Global and Travel Health Association, 2014). Furthermore, an estimated 200,000 deaths is credited to foodborne and diarrheal diseases yearly (Ihenkuronye 2012).

Although foodborne and diarrheal diseases do not always result in death, they can create lifelong health problems (Hoffman 2011), negatively impact the wellness and productivity of the people, thereby create burden on the health care system and the economy of the nation. Personal hygiene such as hand washing with water and soap several times during the day is important, especially after usage of toilets, before and after meal preparations (Fewtrell et al. 2005). Moreover, it has been demonstrated that hand washing with water and soap before and after eating also reduces the prevalence gastrointestinal and diarrheal diseases (Lopez-Quintero et al. 2009).

Some individuals engage in risky behavior because they are unaware of the consequences or they do not perceive the danger in engaging in such behaviors. It has been shown that many foodborne and waterborne diseases can be transmitted via fecal-oral route. Drinking of untreated well/borehole water is common in Nigeria, particularly among less affluent (Onwughara et al. 2013), because it is more affordable than bottled potable water. However, because of indiscriminate garbage dumping, well/boreholes are often dug close to garbage sites. Furthermore, well/borehole water is often contaminated with Salmonella, E. coli and other enteric pathogens (Onwughara et al. 2013),

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and also contain levels of chromium, cadmium and zinc in excess of WHO recommendation (Kolo et al. 2009), making the water unfit for consumption. Children are particularly vulnerable to waterborne diseases, which undoubtedly contribute to the 124,400 premature deaths of Nigerian children under the age of 5 (World Bank, Water and Sanitation Program – Nigeria, 2012). Milk and other dairy product inclusion in daily diet provide protection against diseases. Although fresh milk from animals possess bacteriostatic properties (Jay et al. 2005; Murphy and Boor, 2000), it supports the growth myriad of bacteria. Hence drinking unpasteurized or raw milk has resulted in several disease outbreaks of Salmonellosis, Campylobacteriosis and E. coli infections (LeJeune et al. 2009).

Suya, is a popular Nigerian roasted meat product prepared, processed and sold under unhygienic conditions as with majority of other ready to eat street vended foods (Ogbonna et al. 2012; Uzeh et al. 2006; Ologhobo et al. 2010; Oranusi and Braide 2012; Eni et al. 2010). Suya consumption has been reported to result in sporadic outbreaks of foodborne diseases (Odusole et al. 2003, Iyang et al. 2005). Moreover, suya is documented to have high level of polynuclear Aromatic Hydrocarbons (PAH) (Ogbuagu and Ayoade 2012), and indiscriminate consumption of yaji (suya) sauce has hematologic effects (Akpamu et al. 2011) which are potential health hazards. Consumer understanding and perceptions of food safety are considered to form the basis of a heuristic framework that guides decisions about behavior (Frewer et al. 1994). There is increase desire to consume minimally cooked or raw foods worldwide thereby minimizing the consumer risk perception of hazards in foods. According to Yang et al. (1998), one strategy to reducing foodborne illness involves implementing food-safety education programs for both consumers and food-handlers. In order to properly design these educational programs, basic and fundamental information is needed as to the eating habits, personal hygiene and food safety knowledge of consumers. Therefore, the goal of this study is to identify some risky behaviors consumers engage in and to provide information on public awareness of food safety and foodborne diseases among Nigerians.

## Materials and Methods

**Study population** The survey was conducted between February-March 2013, to evaluate the risky eating behavior and food safety knowledge and awareness of hazards in food of the public. A set of self-complete questionnaire was designed and administered to students, staff of University, other individuals in the environs of the University in Osun State and individuals who attended religious event in Lagos State from different parts of Nigeria. The survey tool used was divided into four sections. The first set of questions asked about the demographic characteristics of the

respondents. Second section inquired about the eating and hand washing habits; the third examined the high risk consumption and purchasing behavior and the fourth section investigated the food handling habit and food safety awareness of the respondents. One hundred questionnaires were randomly distributed and 87 were collected back.

**Statistical analysis** Data obtained were subjected to descriptive statistical analysis (frequency distributions) and Spearman's rank correlation coefficient ( $\rho$ ) using IBM SPSS statistical software version 20

## Results

### Demographic characteristics of respondents

Table 1 is the summary of the demographic characteristics of the respondents. Of the 87 individuals surveyed, 72.4% of the respondents were between 18 – 29 years of age, 27.6% were 30-59 years old and no one was 60+. The majority, 54% were male. Most (75.6%) were single. When asked what their highest level of education was, most of the respondents (55%) indicated they had secondary school education. All of the 87 respondents were from different parts of the country, with the majority 45.9% being from the South West, followed by 28.2% from the West.

Table 1. Demographics of respondents in the survey ( $n = 87$ )

Parameters	Frequency
<b>Age</b>	
18-29 Years	63 (72.4) <sup>a</sup>
30-59 Years	24 (27.6)
<b>Gender</b>	
Male	47 (54)
Female	40 (46)
<b>Marital status</b>	
Single	65 (75.6)
Married	20 (23.3)
Widowed	1 (1.1)
<b>Level of education</b>	
Primary	1 (1)
Senior secondary	46 (55)
College	16 (19)
Others	20 (24)
<b>Part of the country you reside in</b>	
East	10 (11.8)
North	3 (3.5)
South	9 (10.6)
South West	39 (45.9)
West	24 (28.2)

<sup>a</sup> Figures in parentheses are percentages

As reported in Table 2, 59.8% of the respondents are students; 18.4% are business owners; 5.7% are civil servants; 3.4% are lecturers and 12.6% had other occupation. Most of the respondents (38.5%) did not know or disclose their income followed by (29.5%) individuals earning N20-50,000 (US\$125.00 – 300) per month, also shown in Table 2.

Table 2. Economic status of respondents in the survey (n = 87)

Parameter	Frequency
<b>Occupation</b>	
Student	52 (59.8) <sup>a</sup>
Civil servant	5 (5.7)
Business	16 (18.4)
Lecturer	3 (3.4)
Others	11 (12.6)
<b>Monthly income</b>	
5-19,000 Naira	12 (15.4)
20-50,000 Naira	23 (29.5)
>60,000 Naira	13 (16.7)
Unknown	30 (38.5)

<sup>a</sup> Figures in parentheses are percentages

**Eating and hand washing habits of respondents** Survey results indicated that all of the respondents eat outside of their homes regularly. When asked how often you eat out weekly, about 48.4% of respondents said they eat out twice a week, 29% eat out every day, and majority (86.1%) preferred covered restaurant but 13.9% indicated that they buy their food from street food vendors stationary (buka) and hawked (Figures 1.1 and 1.2).

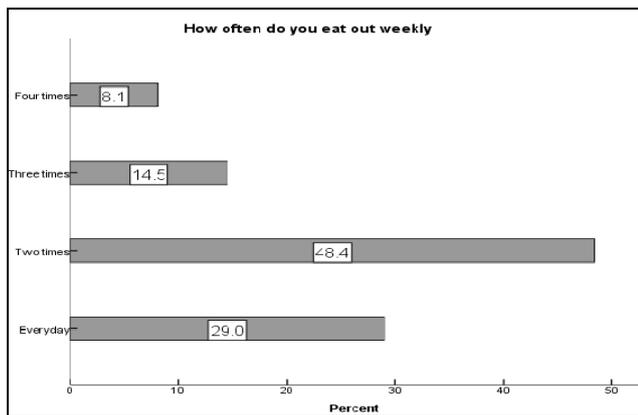


Figure 1.1 Frequency of eating habits of respondents

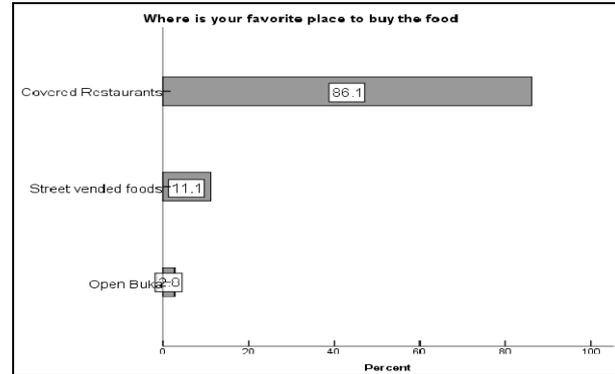


Figure 1.2 Frequency of eating habits of respondents

When asked what the respondents eat the food they purchased with, 69.9% of ate with cutlery, 13.3% ate with fingers and 16.9% used both cutlery and fingers shown in (Figure 1.3).

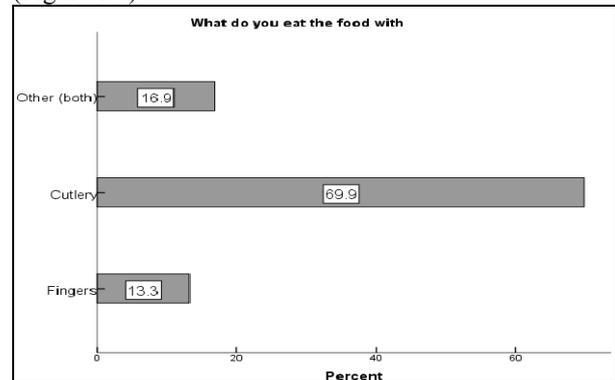


Fig. 1.3 Eating and hand washing habits of respondents.



Fig. 1.4 Eating and hand washing habits of respondents.

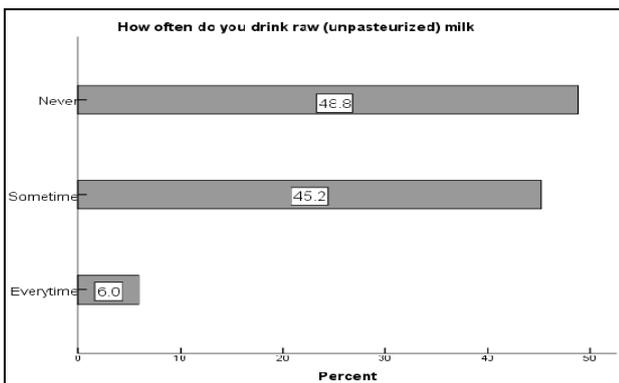


**Fig. 1.5 Eating and hand washing habits of respondents.**

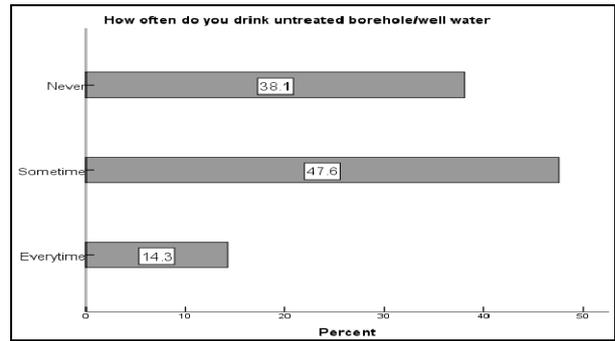
When asked if they wash hands with water and soap before eating, 53.7% sometimes, 37.8% everytime and 8.5% never wash hands and soap before eating (Figure 1.4). While 56%, 40.5% and 3.5% wash hands with water and soap after eating sometimes, everytime and never respectively. Further analysis revealed that of the respondents who eat food with their fingers, 54.5%, 36.4% and 9.1% wash hands with soap before eating every time, sometimes and never respectively, while 36.4%, 54.5% and 9.1% wash hands with soap after eating every time, sometimes and never respectively. But of those who eat with both cutlery and fingers, 25%, 66.7% and 8.3% wash hands with soap before eating and 28.6%, 64.3% and 7.1% wash their hands with soap and water after eating every time, sometimes and never respectively data not shown.

**High risk consumption behavior and purchasing habit**

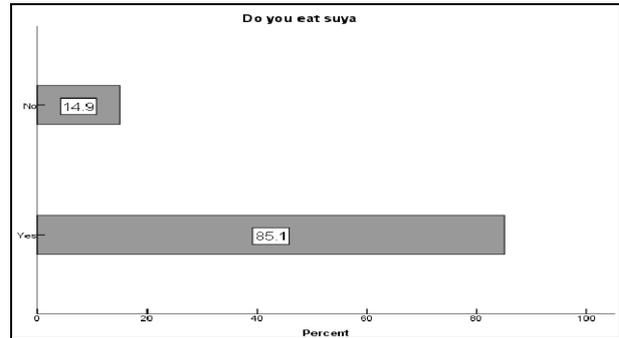
In order to ascertain consumer perception of food safety, the respondents were asked about some risky behavior about food consumption they have engaged in in the past. Over 50% of the respondents consume raw milk sometime or every time, drink untreated borehole/well water and eat suya (Figure 2.1, 2.2 and 2.3).



**Figure 2.1 High risk eating habit of consumers.**

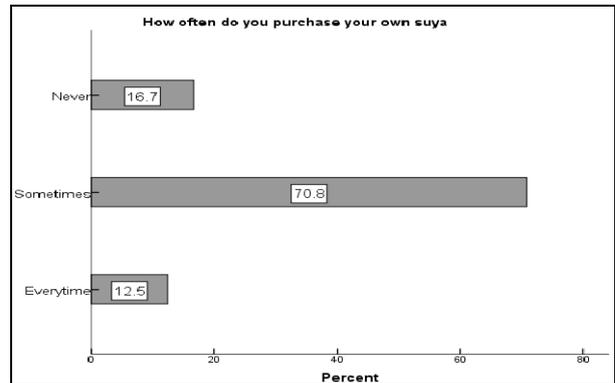


**Figure 2.2 High risk eating habit of consumers.**



**Figure 2.3 High risk eating habit of consumers.**

Respondents were asked series of questions about their purchasing habit. Of the respondents that eat suya, 83.3% purchase the suya, but most 65% do not have a specific vendor. Thirty eight percent of the respondents eat half of what is purchased (Figure 2.4, 2.5 and 2.6).



**Figure 2.4 Purchasing habit of suya consumers**

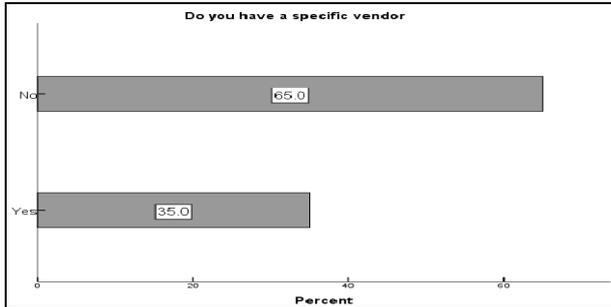


Figure 2.5 Purchasing habit of suya consumers

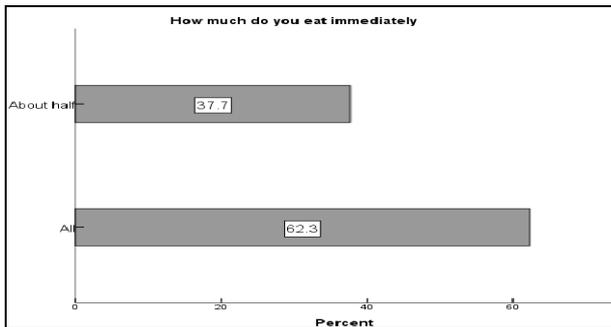


Figure 2.6 Purchasing habit of suya consumers

**Food handling habits and safety awareness of respondents** To determine food handling habits and food safety awareness of respondents, questions were asked about where leftover meat was kept. Seventy eight percent keep leftover less than a day and about 22% of them keep the leftover suya for one day or more (Figure 3.1). Those who ate half of the suya, stored the leftover in the refrigerator/freezer (65%), 13% and 4% stored on the kitchen table and cupboard respectively. About 65% keep the left over for 1day while others kept for 2 days and beyond. Also, 69.5% of the respondents who had suya leftover re-heated before consumption but about 17.4% do not re-heat (Figure 3.2 and 3.3).

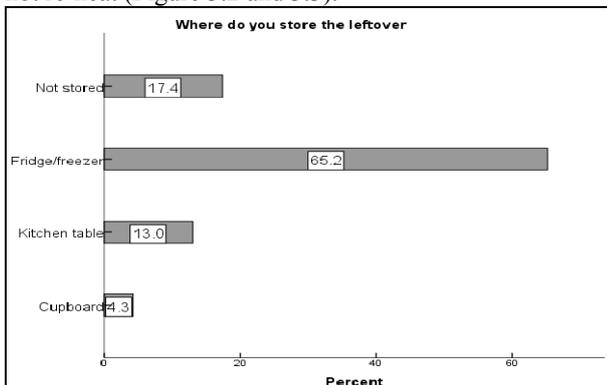


Figure 3.1 Food handling habits of suya consumers.

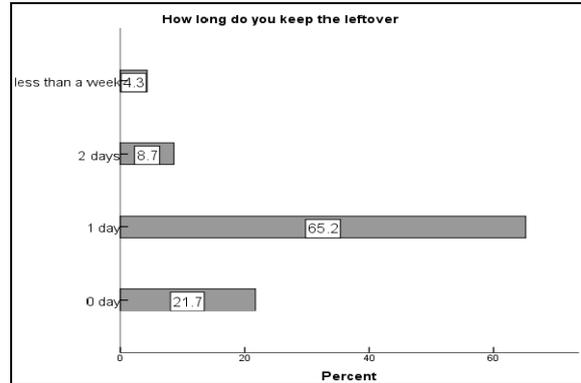


Figure 3.2 Food handling habits of suya consumers.

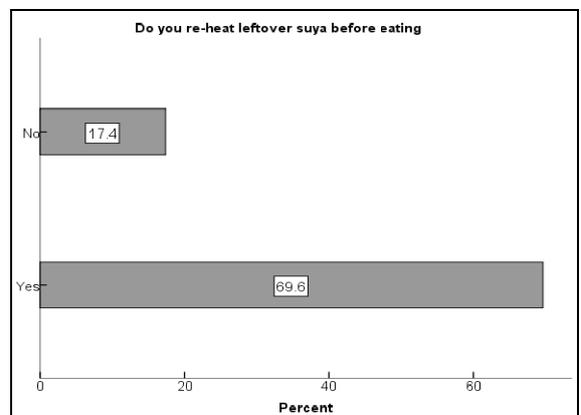


Figure 3.3 Food handling habits of suya consumers.

Then consumers were asked if they are aware of health risks involved in the consumption of the popular meat product and 67.9% said they are aware while 32.1% said no. There was also similar distribution when asked about their familiarity with foodborne pathogens (Figure 4. 4 and 4.5) respectively.

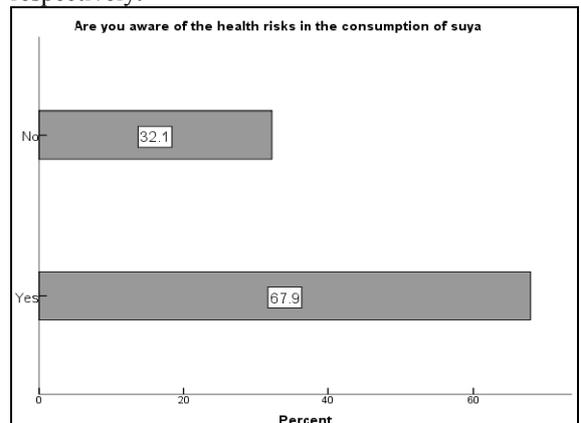
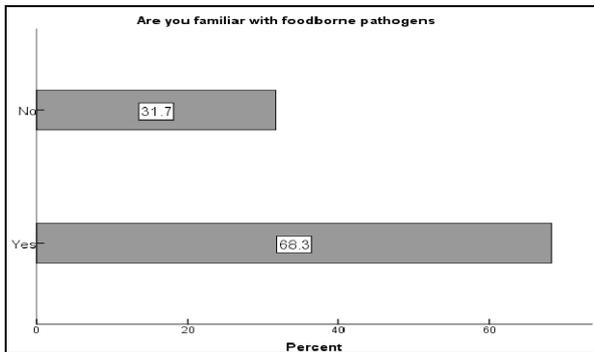


Figure 3.4 Food safety awareness of consumers



**Figure 3.5 Food safety awareness of consumers**

A spearman *rho* correlation coefficient was calculated for the relationship between consumer age, gender, marital status, education level, income level, risky eating habits and knowledge/awareness of hazards in foods. A strong correlation was found between age, marital status gender, income level, education level and risky eating habits of drinking raw unpasteurized milk and consumption of suya meat (Table 3). Weak correlation was found between age, marital status gender, education level and drinking borehole/well water, except for income level, which had a strong correlation. Also in Table 3, there were associations between variables age, gender, marital status, income level, education levels and knowledge /awareness of hazards in foods.

### Discussion

All of the respondents in this study eat outside of their home regularly, which is an indication of the popularity of street vended foods in the country (Ajayi and Oluwoye, 2014). According to the conclusion of many observers, the urbanization of West Africa towns has contributed to increased demand for street foods (Canet and N'Diaye, 1996). Many people travel long distances to their places of employment and are not able to prepare meals for themselves and therefore rely extensively on others to fill their nutritional needs. The personal hygiene practices of the preparers and the vendors cannot be guaranteed because of inadequate availability of facilities and amenities in a developing country such as Nigeria.

In this study, hand washing with water and soap among the respondents that eat with their fingers and fingers/cutlery is not 100% as it should be. It has been demonstrated that hand washing habit with soap and water before and after eating helps to eliminate further transmission of some foodborne pathogens and could lead to reduction in the number of diarrheal diseases. This suggests that public hand washing campaign might be beneficial in the country in reducing the number of foodborne diseases.

The overall results from this study indicated that Nigerian consumers claim to be knowledgeable and aware of hazards and pathogens in foods that may cause them health risks. However, translating this awareness to practice of not engaging in risky eating habits is wanting. This study is in agreement with other studies that concluded that young people are more willing to take risks with their food intake (Yang et al. 1998, Byrd-Bredbenner et al. 2008). For example in this study more young people (18-29yrs. old) eat suya compared to older respondents. But more of older people (30-59yrs. old) claim to drink raw milk. The reason for this could be because young consumers would prefer other drinks or fermented products of milk such as cottage cheese (*nono or wara*) or yogurt to just raw milk. The consumption of raw milk is common among farmers and their household (Jayarao et al. 2006), but with the raw food movement, there is a heightened awareness of consuming raw milk and vegetables around the globe (Salihu et al. 2010). This increasing trend is of public health concern because milk has been recognized as vehicle of transmission of several foodborne pathogens (LeJeune et al. 2009).

Foodborne disease outbreaks involving unpasteurized dairy and dairy products far outnumber that of pasteurized dairy and dairy products in the developed (Langer et al. 2012) and also in the developing countries. According to Olatunji et al. (2012) all the raw milk sampled in one local Area Council in Abuja, Nigeria were contaminated with several species of microorganism including *Bacillus*, *Staphylococcus*, *Salmonella*, *Lactobacillus*, *Streptococcus*, Coliforms mainly *Escherichia coli* and *Campylobacter* spp. (Salihu et al. 2010). Raw milk is highly perishable and must undergo further processing such as freezing or heat treatment shortly after milking (Swai and Schoonman, 2011). Furthermore, poor and unhygienic handling of raw milk and milk products can lead to milk borne infections especially in consumers less than 20 years old (Langer et al. 2012). In Nigeria, milking is done primitively by hand and product exposed to fecal contamination and is of public health concern.

Our study revealed that 70% of the respondents drink borehole/well water, which may be contaminated due to indiscriminate refuse dumping and closeness to the refuse (Kolo et al. 2011). Consumption of waterborne pathogens such as *Salmonella* spp., *Shigella* spp., *E. coli* and *Vibrio cholera* have been demonstrated to cause typhoid fever, gastroenteritis, diarrhea, cholera and deaths (Onwughara et al. 2013). These foods and beverages have been documented to be vehicles of foodborne pathogens and are considered to be high risk foods (Ogbonna et al. 2012, Edema et al. 2008). Furthermore, children, old, pregnant and immune-compromised individuals in the communities are the most vulnerable. Majority of the consumers in this survey were aware of the health risks in consuming suya (67.9%) and claim to be familiar with foodborne pathogens (68.3%) yet continue in the behavior. According to Yang et

al. (1998) study, Persons can be aware of risks but choose to continue the behaviors if they believe they or others could control the risk. As with other self-reported studies, we anticipate that if there is any bias it will be toward over reporting of “good” behavior. The limitation of this study is that individuals who report that they are compliant in certain behavior or habit have been observed to be less compliant. For example, in a study conducted by American Society for Microbiology (2007), 95% of respondents claimed they wash hands after using the toilet but only 66% were observed to actually do so. The findings in this study show that although consumers may know about high risk foods and hazards in foods, the knowledge has not translated to changes in hand washing and eating behavior. It is also possible for consumers to make claims of awareness in order to look good. Therefore campaigns should be targeted at individuals from all works of life, emphasizing personal hygiene and improving food safety education in Nigeria.

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**Table 3 Spearman's  $\rho$  Correlation Coefficients between ranked gender, age, marital status, engagement in risky behavior and awareness of food hazards**

	How often you drink unpasteurized milk	How often you drink borehole/well water	Do you eat suya	Are you aware of the health risks in the consumption of suya	Are you familiar with foodborne pathogens
Age	$\rho(82) = -.387^{**}$ , $p < 0.01$	$\rho(82) = .007$ , $p > 0.05$	$\rho(85) = .246^{*}$ , $p < 0.05$	$\rho(82) = -.022$ , $p > 0.05$	$\rho(80) = .120$ , $p > 0.05$
Gender	$\rho(82) = .225^{*}$ , $p < 0.05$	$\rho(82) = .082$ , $p > 0.05$	$\rho(85) = .131$ , $p > 0.05$	$\rho(82) = -.113$ , $p > 0.05$	$\rho(80) = -.108$ , $p > 0.05$
Education level	$\rho(78) = -.103$ , $p > 0.05$	$\rho(78) = .082$ , $p > 0.05$	$\rho(81) = -.001$ , $p > 0.05$	$\rho(78) = -.116$ , $p > 0.05$	$\rho(77) = -.164$ , $p > 0.05$
Income level	$\rho(74) = -.152$ , $p > 0.05$	$\rho(74) = .200$ , $p > 0.05$	$\rho(76) = .032$ , $p > 0.05$	$\rho(74) = .023$ , $p > 0.05$	$\rho(73) = .298^{**}$ , $p < 0.01$
Marital status	$\rho(81) = .302^{*}$ , $p < 0.05$	$\rho(81) = .057$ , $p > 0.05$	$\rho(84) = -.156$ , $p > 0.05$	$\rho(81) = .114$ , $p > 0.05$	$\rho(79) = -.043$ , $p > 0.05$