

Research Article

Public Health Risks Associated With Egg Consumption Patterns in Ibadan

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ABSTRACT

Foods of animal origin, especially poultry and poultry products, including eggs, have been consistently implicated in sporadic cases and outbreaks of human salmonellosis.

Forty questionnaires were randomly distributed to people that came to purchase eggs at Bodija Market so as to assess the level of egg usage, preparation and consumption practices.

A large proportion (70%) of the sampled population fell between ages (25-64) years. Only (55%) had tertiary education. All the respondents consumed eggs on regular bases with the highest proportion (67.5%) consuming eggs on weekly bases followed by daily consumption of egg (20%). Most respondents stored eggs in containers and crates (67%) followed by refrigerator (25%) and refrigerator and crates (8%). Only 22.5% of the respondents ate well cooked eggs alone while the remaining (77.5%) of the respondents ate one form of raw or undercooked egg. The (25%) respondents that had knowledge of Salmonellosis consumed eggs daily (17.5%). Symptoms of salmonellosis were observed by (7.5%) of the respondents after eating raw or undercooked eggs.

Majority of the consumer population fell between ages 25-64yrs of age. Most of the respondents ate eggs on weekly bases showed that egg is in high demand as a form of animal protein. Most of the respondents consumed raw and under-cooked eggs. In spite of high level of education among respondents, most of the respondents admitted they had never heard of salmonellosis.

Lack of awareness of salmonellosis, presence of egg related food poisoning and risky consumption patterns are of great significance to public health.

Keywords: antibiotics, consumption, egg, food poisoning, salmonellosis.

INTRODUCTION

Data from the US department of Agriculture (USDA/APHIS, 1998) showed that one (1) *Salmonella Enteritidis* contaminated egg could be obtained by the transovarian route out of each 10,000 eggs produced in the U.S. This could imply 1 out of every 1667 composite samples of egg when 6 eggs were pooled to form a composite sample resulting in equal proportion of isolated salmonella from both the egg shell and egg content. In 120 composite eggs sampled, 2 (1.66%) were positive for Salmonella, while 1 (0.83%) out of the 120 pooled samples tested positive for salmonella from the egg content, this suggest that 14 out of every 1667 pools of egg contain salmonella within intact shell eggs. This figure was high and significant and could be attributed to many factors. These factors included the infection of breeder flocks and subsequently layer flocks with no form of on farm control programme as cited by (Wierup *et al*, 1995), poor

management of freshly-laid eggs resulting in contamination with environmental bacteria; storage time/temperature; egg distributor/egg retailer management practices this was similar to the reports of Anderson (Anderson, 1993). Majority of the eggs being sold were exposed to the sun. This study could not determine whether any of these causes played a role, since the purpose of the study was sampling the eggs available directly to the consumers in the market.

The attempts to isolate SE from eggs in different parts of the world, have yielded variable results. In Germany, 10 SE strains were isolated: 5 from egg yolks, 3 from egg whites, and 2 from eggshells (Buchner, Nermter and Henkel, 1991); In contrast, only one *Salmonella agona* strain was isolated in Poland from an eggshell out of 400 eggs sampled. Nevertheless, in a second research phase, three SE strains were isolated from

eggshells and none from egg content samples out of 300 eggs sampled (Radkowski,1990).In Mexico only 1 SE strain was isolated from one egg yolk out of 400 eggs sampled (Arturo et al ,2005) This finding suggests that contamination rates vary in different parts of the world.

METHOD

The 40 questionnaires were randomly distributed to people that came to purchase eggs at Bodija Market so as to assess the level of egg usage, preparation and consumption practices particularly at home. The survey helped to shed light on different aspects of how consumers prepare and use shell eggs and on the demographics of those who were exposed to home prepared raw or undercooked eggs.

RESULT

A large proportion (70%) of the sampled population fell between ages (25-64) years (Fig: 1). Only (2.5%) of the sampled population was above 65 yrs. All the respondents had one form of education or the other, however only (55%) had tertiary education (fig: 2).

Analysis of egg consumption rate showed that all the respondents consumed eggs on regular bases with the highest proportion of the respondents (67.5%) consuming eggs on weekly bases (Table 1). None of the respondents stayed as long as a year interval without consuming eggs. Daily consumption of egg accounted for (20%) of the respondents (table 1).

A sizable sum (67%) of the respondent stored there eggs in other places specifically (in containers and crates) Storage of eggs in the refrigerator accounted for only (25%) of the respondents and (8%) of the respondents said they stored their eggs both in the refrigerator and crates (fig. 3).

The survey provided information on the consumption of two categories of potentially unsafe eggs: "raw or near raw" were raw eggs and uncooked or lightly heated foods containing eggs as ingredients such as eggs drinks, frosting and salad dressing".

Undercooked" eggs were eggs prepared as a main dish (referred to here as egg dishes), which were not thoroughly cooked until both white and yolk are firm, such as a fried egg with a "runny" yolk, poached, soft boiled, scrambled and omelet . Most of the respondents consumed raw or undercooked eggs in one form or the other .Many of those respondents that preferred hard boiled eggs still consumed a form of raw or undercooked egg. Only 22.5% of the respondents ate well

cooked eggs alone i.e. (hard boiled eggs) the remaining (77.5%) of the respondents ate one form of raw or undercooked egg. see (Table 2). In Table 3, from the (25%) respondents that had knowledge of Salmonellosis, (17.5%) of them consumed eggs daily. Out of the 10 respondents that had knowledge of salmonellosis, 9 of them consumed hard boiled eggs alone, this accounted for 25% of the respondents. The rest of the respondents (75%) that ate raw or undercooked eggs had no knowledge of Salmonellosis (Table 4). Majority of the consumers (92.5%) never observed any of the listed symptoms after eating raw or undercooked eggs however, diarrhea , vomiting and headache were the only observed symptoms by (7.5%) of the respondents (Table 6).Out of the (7.5%) respondents that observed one or more of the clinical syndromes in (Table 7), 5% of them used medication. Panadol (Paracetamol) and Antibiotics were the two medications used by the infected respondents as seen in (Table 8).

DISCUSSION

To estimate the consumer risk of contacting Salmonella infection via shell eggs, a survey of 40 respondents was conducted to study how households purchase, store, handle and use eggs. The questionnaires were administered to consumers in the market as they came to buy eggs. The age range used in the study was to capture the consumption pattern of 2 susceptible population (0-5 and 65+), but from the survey carried out, majority of the consumer population (70%) fell between ages 25-64yrs of age.

Shell eggs were usually purchased weekly accounting for 47.5% of the respondents, while 42.5% of the respondents bought less than a crate at a time. A fairly large proportion of the respondents (67.2%) ate eggs on weekly bases showed that egg is in high demand as a form of animal protein. This agrees with the reports of (Adesola, 2005). It was proved that maintaining eggs at room temperature promotes the proliferation of pathogenic and non-pathogenic bacteria present inside the egg these bacteria are deleterious for egg quality and hazardous to consumers' health (Arturo, 2005). However, shell eggs are safest when stored in the refrigerator till they are needed because; egg white contains natural antibacterial products that help to kill or inhibit the growth of bacteria. Only 32.5% of the consumers stored their eggs in the fridge; most of the consumers stored their eggs in containers and crates. Majority of the respondents (75%) said they washed their hands after and before handling

eggs, the remaining 25% admitted not washing their hands. This showed that hygiene was fairly observed.

Salmonellae can survive in lightly cooked eggs or raw egg dishes to cause human disease (Humphrey, *et al.* 1990). Most of the respondents ate one form of raw or undercooked egg. Consumption of well cooked eggs (hard boiled) alone accounted for 22.5% of the total amount of eggs consumed. Consumption of raw and under cooked eggs accounted for the remaining 75.5% of all the types of egg consumed. Despite the moderately high level of education among the respondents, a large proportion (75%) of the population admitted they had never heard of salmonellosis before. Out of the remaining 25% of respondents that had knowledge of Salmonellosis (22.5%) ate hard boiled eggs. It can then be deduced that their knowledge of Salmonellosis is responsible for their safe egg consumption pattern of not consuming any form of raw or undercooked egg.

Almost all the respondents said they had not observed any of the symptoms listed in the questionnaire after consuming eggs. This might be due to the low level of knowledge

about Salmonellosis so that even if such symptoms were observed they were not attributed to eating eggs. Only 7.5% of the respondents admitted observing one form of symptom or the other, namely, diarrhea, vomiting and headache. One of the consumers that observed diarrhea consumed only hard boiled eggs; these might be attributed to post-processing contamination. On the other hand the remaining two respondents had consumed raw and undercooked eggs and had no Knowledge of Salmonellosis. These respondents showed cases of food poisoning. Medications namely panadol (paracetamol) and antibiotics were used by 5% of the respondents that noticed these symptoms.

Thus, the Lack of awareness of salmonellosis, presence of egg related food poisoning and risky consumption patterns are of great significance to public health.

Due to low level of awareness on egg related salmonellosis, it is highly recommended that Nigerian Veterinary Medical Association should intensify efforts on awareness program to educate the populace on prevention of egg related salmonellosis.

Table 1: Frequency of egg consumption

	Frequency	Percentage
Daily	8	20.0
Weekly	27	67.5
Monthly	5	12.5
Within the year	0	0.0
Total	40	100.0

Table 2: Egg consumption pattern among respondents

S.No	Egg consumption patterns	Frequency	Percent
1	hb	9	22.5
2	hb/sc	9	22.5
3	hb/sc/p	1	2.5
4	hb/sc/ied	1	2.5
5	hb/sc/sb/isd	1	2.5
6	Hb/o	1	2.5
7	Hb/fwry	1	2.5
8	Hb/isd/f	1	2.5
9	Sb	3	7.5
10	sb/sc	1	2.5
11	sb/sc/isd/o	2	5.0
12	sb/sc/fwry	1	2.5
13	sb/sc/ied	2	5.0
14	Sc	1	2.5
15	c/o/isd	2	5.0
16	Sc/fwry	1	2.5
17	O	1	2.5
18	o/fwry/isd/ied	1	2.5
19	hb/sc/fwry	1	2.5
	Total	40	100.0

Key: hb: hard boiled fwry: fried with running yolk isd: in salad dressing
led: in egg drink f: frosting p: poached
Sb: soft boiled Sc: scrambled o: omelet

Table 3: Consumers response to the knowledge of Salmonellosis.

S.No	Response	Frequency	Percentage
1	Yes	10	25
2	No	30	75
	Total	40	100.0

Table 4: Cross tabulation between egg consumption rate and knowledge of Salmonellosis

EGG CONSUMPTION RATE				TOTAL
KNOWLEDGE ON SALMONELLOSIS	IN A DAY FREQUENCY (%)	IN A WEEK FREQUENCY (%)	IN A MONTH FREQUENCY (%)	
YES	7(17.5)	2(5.0)	1(2.5)	10(25.0)
NO	1(2.5)	25(62.5)	4(10.0)	30(75.0)
TOTAL	8(20.0)	27(67.5)	5(12.5)	40(100.0)

Table 5: Cross tabulation between knowledge on salmonellosis and egg consumption pattern

S.No	EGG CONSUMPTION PATTERN	KNOWLEDGE OF SALMONELLOSIS (FREQUENCY)		
		YES	NO	TOTAL
1	Hb	9		9
2	Hb/sc		9	9
3	Hb/sc/p		1	1
4	Hb/sc/ied		1	1
5	Hb/sc/sb/isd		1	1
6	Hb/o		1	1
7	Hb/fwry		1	1
8	Hb/isd/f		1	1
9	Sb		3	3
10	Sb/sc		1	1
11	Sb/sc/isd/o		2	2
12	Sb/sc/fwry		1	1
13	Sb/sc/ied		2	2
14	Sc		1	1
15	c/o/isd		2	2
16	Sc/fwry		1	1
17	O		1	1
18	o/fwry/isd/ied	1		1
19	Hb/sc/fwry		1	1
	Total	10	30	40

Table 6: Clinical symptoms observed in respondents after consuming egg

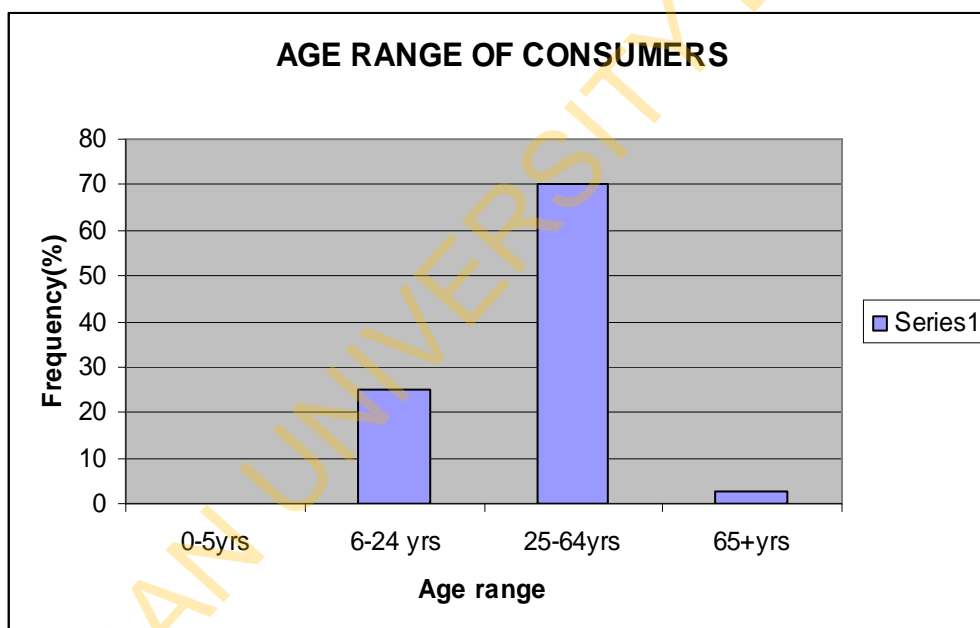
S.No	Clinical Syndromes	Frequency	Percentage
1	Vomiting	1	2.5
2	Diarrhea	1	2.5
3	Diarrhea and head ache	1	2.5
4	Never observed	37	92.5
	Total	40	100

Table 7: Responses of consumers that observed clinical symptoms to the use of medication

S.No	Response as to the use of medication	Frequency	Percentage
1	Yes	2	5.0
2	No	1	2.5
	Total	3	7.5

Table 8: Type of medication used

S.No	Medication used	Frequency	Percentage
1	Panadol (Paracetamol)	1	2.5
2	Antibiotics	1	2.5
	Total	2	5.0

**Fig. 1: Showing Age range of consumers**

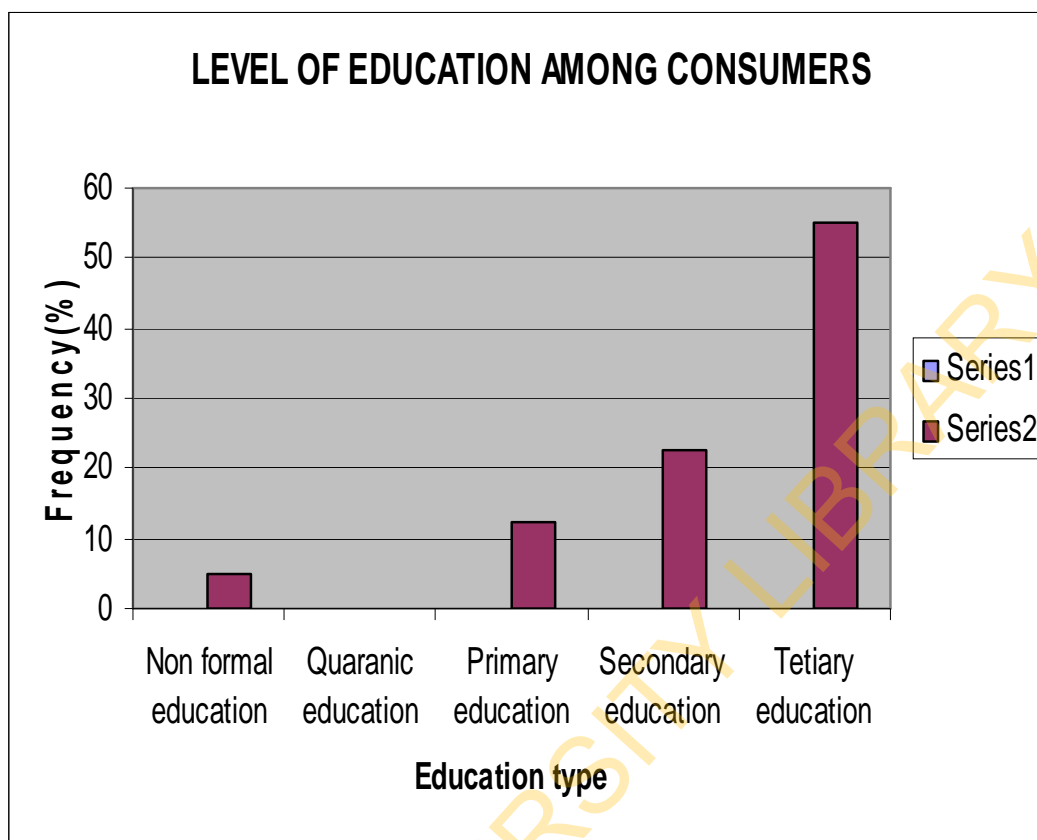


Fig. 2: Showing level of education among respondents

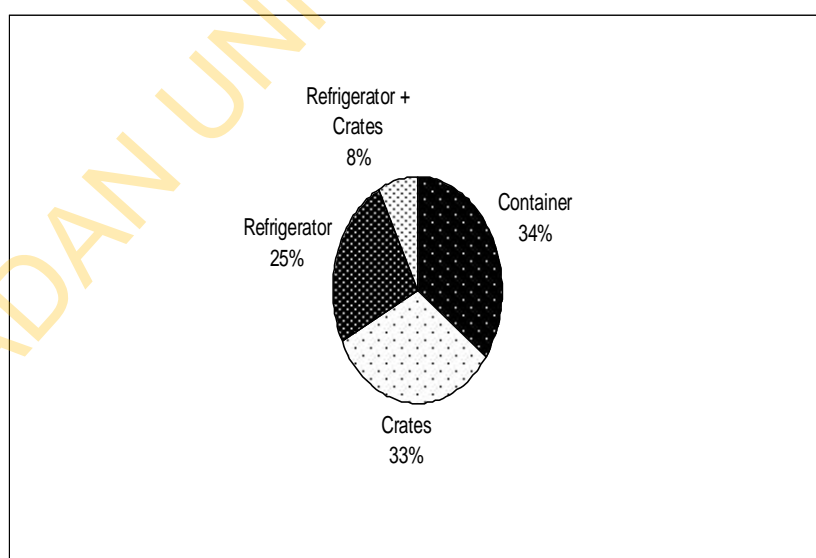


Fig. 3: The storage patterns of the eggs purchased by respondents

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