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Raw Food Additives and Preservation among Traders in Enugu Metropolis

Odo Chinenye C.*, Obi Valentine T., Obu Ugochukwu E., Obidiegwu Jonathan I.

Department of Medicine, University of Nigeria

*Corresponding Author

Abstract

Background: Food additives and preservation methods are practices employed during the production or processing of food, to improve its appearance, taste, and other qualities of concern. While some of these provide nutritional benefits or improve food safety, others are known to pose potential health risks and cause harm to the human body.

Objective: The overall objective of this study is to profile and analyze the practice and perception of health effects of raw food additives and preservation methods, among traders in Enugu metropolis.

Methodology: New market and Old Artisan were the two markets selected in Enugu North Local Government Area, from which 402 raw food traders were selected using a multi staged sampling method. A semi structured questionnaire was administered over two weeks in this descriptive cross-sectional study to traders who deal in palm oil, beans, maize, rice, pawpaw, orange and banana (at least 57 traders per food item).

Result: A total of 402 traders (minimum of 57 for each food item) were studied. commonest practice for preventing palm oil spoilage was by Enugu metropolis traders was by addition of salt [21 traders (36.8%)], and for reddening their oil, addition of red food color (tartrazine)[24 traders (42.1%)], while For improving the quantity of their palm oil, water was added [15 traders (26.3%)]. To improve taste, the commonest additive was salt [23 traders (40.4%)]. The commonest preservation method used for grains against weevil by Enugu metropolis traders is use of pesticides; beans [8 - 23 traders (14.0% - 40.4%)]. The commonest additive added in grains to prevent spoilage by Enugu traders is Aluminum Phosphide; [9 - 27 traders (15.8% - 47.4%)]. The commonest additive used by Enugu metropolis traders to ripen their fruits was Calcium carbide (3.4% - 19.0%). The commonest methods employed in ripening fruits among Enugu traders was wrapping in an airtight polythene bag [4 - 29 traders, (6.9% - 50.0%)]. Red paint was the commonest additive perceived to be harmful by palm oil traders (11, 19.3%). This is followed closely by red food color tartrazine (8, 14.0%). DDVP was the commonest additive perceived to be harmful by most grain sellers [8 - 16 out of 57 respondents (14.0% - 28.1%)] . Calcium carbide was the commonest fruit additive perceived to be harmful by most fruit sellers [1 - 7 out of 57 respondents (1.7% - 12.1%)].

Conclusion: Overall, the use of unsafe additives and preservation methods were noted among the respondents. Many of whom did not perceive any harmfulness associated with the use of these additives. The findings agree with several similar studies in the past, and recommendations to the traders, consumers, governmental and non-governmental agencies have therefore been made.

Keywords: Public Health, Food safety, Food practice

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1. Introduction

Food preservation is as old as the history of husbandry. As soon as man settled down to domesticate his crops and animals, he also found the need to store what excess he has for future use. High post-harvest food losses, arising from limited food preservation capacity, are a major factor constraining food and nutrition security in developing countries of West Africa where seasonal food shortages and nutritional deficiency diseases are still a major concern (Oduro-Yeboah, 2016). The FAO (2019) estimated a worldwide annual post-harvest loss of fourteen percent in raw foods; however, losses up to thirty percent have been reported in tropical countries of Africa. It is estimated that about 50% of perishable farm produce including fruits, vegetables, roots, and tubers and about 30% of food grains including maize, millet, rice and so on are lost after harvest in West Africa (Olunike, 2014). Ineffective or inappropriate food processing technologies, careless harvesting and inefficient post-harvest handling practices, bad roads, moribund rail systems, bad market practices and inadequate or complete lack of storage facilities, packing houses and market infrastructures are some of the factors responsible for high post-harvest food losses in West Africa countries (Asogwa I.S, 2017).

In Nigeria, foods are seasonal, and they are produced in great amounts (i.e., in cornucopia) during their harvest seasons. However, the hot and humid weather conditions make it favorable for microbial food spoilage, which constitutes a menace in food management. The human food is attacked by many organisms that thereby compete with man for his food (Olurankinse C.A., 2014). Moreover, illiteracy, poor farming and poor social amenities like electricity failure, bad roads and other mentioned factors still exist in low-income countries like Nigeria. The unpredictable nature of food availability, especially seasonal vs off-seasonal products, and the increasing climate changes, which encourage food spoilage, have led to huge losses in quantity, quality and monetary terms, especially for the traders who depend on foods as their source of livelihood. This is not without consequences to Nigeria, who is presently facing serious food crises as several metric tons of food produced do not get to Nigerians dining tables.

The capacity to preserve food is directly related to the level of technological development and the slow progress in upgrading traditional food processing and preservation techniques in Nigeria contributes to food and nutrition insecurity (Oduro-Yeboah, 2016). It is useless spending a lot of labor, time and money on food production only to have them wasted or spoiled and as indicated before, this practice is a laborious one with the Nigerian raw food traders.

Traditional technologies of food processing and preservation are generally employed in Nigeria and unlike the electronic and other ultramodern technology industries, they were used years before any scientist understanding of their essential nature and consequences. Food preservation is a major part of the culture of the people and local food processing and preservation activities constitute a vital body of indigenous knowledge handed down from parent to child over several generations. Unfortunately, this vital body of indigenous knowledge is grossly understudied and therefore fraught with so many risks. The contestation of food additives has become a growing issue, and unlike the past, industries have begun to promote the use of unnatural additives to help preserve and color food. Consequently, scientists, consumers, and manufacturers have begun to question the necessity and safety of these substances as they have been linked to hypersensitivity, food poisoning and other health risks.

Despite the efforts by the Nigerian government and international agencies, a lot still needs to be done in the control of the usage of raw food additives and in food preservation. The burden of food poisonings and outbreaks of health concern related to raw food additives and preservation is difficult to summarize, but available data for food poisoning from all causes in Nigeria has been estimated as two million cases annually with estimated deaths of 200,000 Nigerians WHO (2019). Also of concern, is the growing injudicious use of agro pesticides, which due to lack of surveillance systems and population-based studies, the outcomes are not adequately documented. Food additives are responsible for a significant number of health facility visits and hospitalizations. On different occasions, families have been wiped out after innocently consuming these poisoned food items (Punch Editorial Board, 2018). These chemicals are applied to crops during planting and post-harvest to "preserve" them before they reach consumers (Punch Editorial Board, 2018).

The problem is based on the perceived harmful effects and health risks of raw food additives and preservation. Are the traders aware of these problems? What is their attitude towards it? And what are the common additives they employ? The scope of the study is on raw food items with particular interest in grains (beans, maize , rice) fruits (banana, orange, pawpaw) and palm oil.

2. Method

The study was conducted in Enugu State, a mainland state in the South-East geo-political zone of Nigeria, with a land area of approximately 8,727.1 square kilometers (3369.6 sq. miles). The state is located within the rainforest belt at longitude (6.50N, 7.50E). Enugu State had a population of 3,267,837 people at the census held in 2006 (estimated at 3.8 million in 2012). It is the home of the Igbo of Southeastern and few Idoma/Igala people in Ette (Igboeze-North) of Enugu State, Nigeria. Economically, the state is predominantly rural and agrarian, with a substantial proportion of its working population engaged in farming, although trading (18.8%) and services (12.9%) are also important. There are 17 Local Government Areas in the State. Enugu metropolis comprises: Enugu North, Enugu East and Enugu South LGAs. Each of these LGAs has at least one major food market and several smaller ones. Enugu Metropolis has three major markets where foodstuff (including grains and palm oil) are sold in large quantities and several small markets evenly distributed across the city. Some smaller markets standout such as Old Artisan market, New Artisan market, Kenyatta market, Coal Camp market, Abakpa market, Mayor market and New Haven market. This study was conducted in New Market, Ngwo, Enugu North and Old Artisan Market, Achara, Enugu North as they are some of the largest foodstuff markets in the metropolis, with traders coming from all over the state as well as heavy-duty vehicles carrying food items from all over the country to be offloaded there first upon entry into the state. The population of study included traders selling palm oil, beans, maize, rice, pawpaw, orange, and banana (locally produced or imported) in New Market and Old Artisan which summed up to 402 participants. This study was a descriptive cross-sectional design. In this study, semi structured questionnaires were administered via interviews to assess the practice and perception of health effects of food additives and preservation among Enugu raw food traders. The respondents were categorized according to their goods and their opinions were sought on the subject matter. This method was chosen because it depicts human interaction and perspectives accurately and interviewees are perceived to give a more honest answer and opinion through personal interactions with the interviewer. Furthermore, the market is a very busy location and to save time for both the researcher and the sellers this method was

deemed suitable. Multistage sampling technique was employed in this study. Firstly, Enugu North Local Government was randomly selected from the three Local Governments in Enugu metropolis. Secondly, New Market and Old Artisan Markets were randomly chosen from the 8 major markets. The food traders were then divided into 7 subgroups (according to the food items): palm oil, maize, rice, beans, pawpaw, orange, banana. Next, the sample size was shared proportionately between all 7 subgroups with each allocated 57 questionnaires and the respondents were chosen systematically based on stall numbers. The chosen markets were in the urban area where more buying, selling and consumption activities of the study foods items takes place and the respondents in these markets provided useful information needed for this study. A semi-structured interviewer-administered questionnaire (Appendix) was employed for each food Item. The information collected include demographic characteristics such as age, sex and highest level of education, preservation methods and additives for palm oil, grains and fruits, as well as the perception of harmful health effects. The questionnaire was pre-tested before use at Mami Market UNTH, Ituku-Ozalla, Awgu Local Government Area, Enugu State. Introductory announcements were made via the market union before the arrival of the researchers to allay their suspicions and fears of law enforcement agencies. Questionnaires were administered by the researchers. The researchers introduced themselves and obtained informed verbal consent from the traders. The data collection was done over a period of two weeks. The interviews were conducted in English for the literate traders and for the illiterate traders, the native language (Igbo) which was spoken by all researchers was used. The data for this work were presented in tables and figures. The tables were structured to capture the essential areas of the questionnaire as well as other relevant information. The data was entered in an excel spreadsheet and analyzed using SPSS version 25. Ethical approval for this study was obtained from the Health Research Ethics Committee of the University of Nigeria Teaching Hospital. In addition, verbal informed consent was obtained from all participants before administering the questionnaire, having explained the purpose and benefits of the research as well as the voluntariness of participation to the participants in their fluent language. Confidentiality was maintained throughout the study.

3. Result

Analysis in this research was done using SPSS (Statistical Package for Social Sciences) version 25. All four hundred and two (402) questionnaires distributed were returned and all were used for analysis.

Table 4.1 shows the demographic characteristics of all respondents. Majority of the respondents, 109 (27%) were aged between 30-39 and 287(71%) of them were females. Most of them, 189(47%) had Secondary education as their highest level of education. More of the sampled population, 356(89%) traded at New Market.

The additives/practices used by the palm oil respondents mainly included: addition of salt, 21 (36.8%) and storage in container, 15 (26.3%) for spoilage prevention, addition of red food color (tartrazine), 24 (42.1%) and azo dye, 13 (22.8%) for color improvement, addition of water, 16 (26.3%) for quantity increase and addition of salt, 23 (40.4%) for taste improvement.

The commonest methods used by beans sellers to protect their grains from weevil are the use of dry pepper, 24 (42.1%) and the use of pesticides/chemicals, 23 (40.4%). Majority of the sellers used nothing, 38 (66.7%) to prevent their beans from spoiling, while some used Aluminum phosphide, 13 (22.8%) and Dichlorovinyl dimethyl phosphate DDVP, 13 (22.8%).

17 (29.8%) of those who used pesticides/chemicals applied them directly on the grain. 12 (21.1%) of those who applied the additives applied them three times a year.

Table 4.1: *Demographic Characteristics of all respondents n=402*

	Frequency	**Percent%**
Age		
<20	50	12
20-29	86	21
30-39	109	27
40-49	57	14
50-59	25	6
60 and above	75	19
Gender		
Female	287	71
Male	115	29
Highest Level of Education		
No formal education	36	9
Primary education	113	28
Secondary education	189	47
Tertiary education	64	16
Market		
New Market	356	89
Old Artisan	46	11

The 15 (21.1%) maize sellers used pesticides to protect their grains from weevil while 11 (15.5%) did so by sun drying. To prevent their maize from spoilage, 27 (39.7%) used Aluminum phosphide and 8 (11.8%) used Dichlorovinyl dimethyl phosphate (DDVP). 11 (17.4%) of the maize sellers applied these additives directly on their grains while 14 (22.2%) wrapped the additives in cellophane before placing them on the grains. 10 (17.5%) applied these additives three times a year while 6 (10.5%) applied them twice a year.

The preventive practices used by the sellers against weevils were majorly storing in airtight containers or polythene bags, 11 (19.3%%) and sun drying, 11 (19.3%). Commonest preventive practices against spoilage were use of aluminum phosphide, 9 (15.8%) and dichlorovinyl dimethyl phosphate DDVP, 7 (12.3%). Commonest methods of applying additive was mainly that of wrapping the additive in cellophane before placing on grain, 4 (7.0%) and applying additive to the room where grain is stored, 4 (7.0%) while the commonest frequencies of using

the additives was twice yearly, 3 (5.3%), 3 times yearly, 3 (5.3%) or more than 4 times yearly, 3 (5.3%). Majority did not apply anything, 45 (78.9%).

The additive used to ripen paw-paw was majorly salt solution, 12 (20.7%) and calcium carbide, 11 (19.0%). For methods used, the majority prefer to sprinkle water, 23 (39.7%).

There was hardly any additive used to ripen orange, 51 (87.9%). Calcium carbide, 2 (3.2%) and Ethylene, 3 (5.2%) were amongst the notably mentioned. Majority hardly used any method to ripen the fruits, 28 (48.3%); few cover or wrap oranges in porous sac bag, 17 (29.3%) while fewer sprinkle water on it, 8 (13.8%).

The most additives used to ripen banana were calcium carbide, 9 (15.5%) and ethylene, 8(13.8%). Actually, wrapping bananas in airtight polythene bags was the prevalent method used to ripen the fruit, 29 (50.0%) followed by covering or wrapping in porous sac bag, 12 (20.7%)

The perceptions of harmfulness of the preservation methods and food additives reported by Palm oil sellers were presented in this section with the aid of a table.

Table 4.4.1: *Palm Oil additives perceived to be harmful by Palm Oil Sellers n=57*

	Frequency	**Percent (%)**
Name the method or additive that can be harmful to the consumer		
Can't say	29	50.9
Red Paint	11	19.3
Red food colour (Tartrazine)	8	14.0
Azo dye	5	8.8
Olive oil	3	5.3
Sugar	3	5.3
Sudan III	2	3.5
Potassium hydroxide	2	3.5

Table 4.4.1 shows that red paint, 11 (19.3%) and red food colour, 8 (14.0%) were the most perceived to be harmful.

Table 4.4.2: *Methods and Additives perceived to be harmful by Beans Sellers* *n=57*

	Frequency	Percent (%)
Method or additives that could be harmful		
· Don't know	25	43.9
· Dichlorovinyl dimethyl phosphate DDVP	16	28.1
· Kerosene	11	19.3
· Storing in wrong containers	3	5.3
· Aluminium phosphide	3	5.3
· Longtime storage	1	1.8
· Aeration	1	1.8

From **Table 4.4.2**, Dichlorovinyl dimethyl phosphate DDVP, 16 (28.1%) and use of kerosene, 11 (17.5%) were most perceived to be harmful.

Table 4.4.3: *Additives perceived to be harmful by Maize Sellers* *n=57*

	Frequency	Percent (%)
Method or additives that could be harmful		
· Don't know	35	61.4
· Dichlorovinyl dimethyl phosphate DDVP	13	22.8
· Aluminium phosphide	9	15.8
· None	2	3.5

From **Table 4.4.3**, Dichlorovinyl dimethyl phosphate, 13 (22.8%) was most perceived to be harmful.

Table 4.4.4: *Methods and additives perceived to be harmful by Rice Sellers* *n=57*

	Frequency	Percent (%)
Method or additives that could be harmful		
· Can't say	40	70.2
· Dichlorovinyl dimethyl phosphate DDVP	8	14.0
· Other pesticides	7	12.3
· Aluminum phosphide	3	5.3
· Kerosene	1	1.8

From **Table 4.4.4**, Dichlorovinyl dimethyl phosphate DDVP, 8 (14.0%) and use of other pesticides, 7 (12.3%) were most perceived to be harmful.

Table 4.4.5: *Perception of harmfulness of Preservative Practices by Paw-paw Sellers* *n=58*

	Frequency	Percent (%)
Perceived harmful substances to health		
· Nothing	47	81.0
· Calcium carbide	7	12.1
· Ethylene (ethene)	1	1.7
· Ethephon (Mr. ripe)	1	1.7
· Ethylene glycol	1	1.7
· Ascorbic acid	1	1.7

Findings in **Table 4.4.5** show that calcium carbide, 7 (12.1%) was perceived most to be harmful. 47 (81%) perceived that none of the additives were harmful.

4. Discussion

This study set out to profile and analyze the practice and perception of health effects of raw food additives and preservation methods among traders in Enugu metropolis. The foods of study included: Palm Oil (57 respondents), beans (57 respondents), maize (57 respondents), rice (57 respondents), pawpaw (58 respondents), orange (58 respondents) and banana (58 respondents). The commonest practice for preventing palm oil spoilage by Enugu metropolis traders was by addition of salt [21 traders (36.8%)], followed by storing in milk tin containers 15 traders (26.3%)] and boiling [10 traders (17.5%)]. Palm oil traders in Enugu Metropolis reddened their oil by adding red food colour (tartrazine) [24 traders (42.1%)], this is followed by Azo dye [13 traders (22.8%)] and Red paint [11 traders (19.3%)]. For improving the quantity of their palm oil, 15 traders (26.3%) added water while 38 traders (66.7%) did not add anything. To improve taste, 23 traders (40.4%) added salt while 32 traders (56.1%) did not add anything to improve the taste of their palm oil. In comparison, an Akwa-Ibom study found out that carrot, pawpaw, lime and red dye form the major additives in palm oil. An Abakaliki study also found that Traders add leaf sheaths of sorghum to palm oil. These are very supportive to our findings and could be due to the proximity of Enugu and Abakaliki. A study in Ghana, found that about 60-80% of colouring agents added in palm oil was azo dye in the form of sudan I, II, III and IV. This conforms to the findings in this study and further analytical study to find out the actual content of azo dyes in palm oil among Enugu traders is important.

The commonest preservation method used for grains against weevil by Enugu metropolis traders is use of pesticides; beans [23 traders (40.4%)], maize [15 traders (26.3%)], rice [8 traders (14.0%)]. The commonest additive added in grains to prevent spoilage by Enugu traders is Aluminium Phosphide; beans [13 traders (22.8%)], Maize [27 traders (47.4%), Rice [9 traders (15.8%)]. This is followed by use of DDVP (dichlorovinyl dimethyl phosphate); beans [13 traders (22.8%)], maize [8 traders (14.0%)], rice [7 traders (12.3 %)]. This is closely related to a similar study in Kaduna where it was observed that 46% grain sellers used KODO in their grains. Also, an Akure study placed Pesticides (organophosphate) use among traders in their grains at 50%. Another study done in 2019 which assessed the practice of pesticide application among beans and maize sellers in an urban south western Nigerian market showed that 33.5%

apply pesticides (DDVP) on their grains. This disparity in prevalence could be due to availability and ease of accessibility of the additives to the traders. However, a different trend is found in developed countries where edible and safe additives are employed. Such is shown by a study done in Slovenia where thyme essential oil was found to be an effective additive used in grains. This thyme essential oil was not observed among Enugu traders. This could be due to the cost and unavailability. Further studies on the prevalence of essential thyme oil among Enugu grain sellers may clarify this.

The commonest additive used by Enugu metropolis traders to ripen their pawpaw was sprinkling with salt solution [12 traders, (20.7%)]. For Orange it was ethylene [3 traders (5.2%)]. For bananas, it was calcium carbide [9 traders (15.5%)]. The commonest methods employed in ripening paw-paw among Enugu traders was by sprinkling with water (23 traders,39.7%), Orange; covering in a porous bag (17 traders, 29.3%) and Banana; wrapping in airtight polythene bag (29 traders, 50.0%). Majority of fruits sellers in Enugu did not add any additive to ripen their fruits [Paw-paw: 37 traders (63.8%), Orange: 51 traders (87.9%), Banana: 39 traders (67.2%)]. Majority also did not employ any method in ripening their fruits [Pawpaw: 16 traders (27.6%), Orange: 28 traders (48.3%), Banana: 13 traders (22.4%)] In comparison to a study done in Ilorin, Nigeria in 2020, out of 85 respondents, 94% of them do store their banana, 83% were aware of the use of calcium carbide in ripening banana but only 1% admitted using it.

Red paint was the commonest additive perceived to be harmful by palm oil traders (11, 19.3%). This is followed closely by Red food color tartrazine (8, 14.0%). DDVP was the commonest additive perceived to be harmful by most grain sellers [beans: 16 out of 57 respondents (28.1%), maize: 13 out of 57 respondents (22.8%), rice: 8 out of 57 respondents (14.0%)]. Calcium carbide was the commonest fruit additive perceived to be harmful by most fruit sellers [pawpaw: 7 out of 57 respondents (12.1%), Orange: 1 out of 57 respondents (1.7%) and banana 6 out of 58 respondents (10.3%).

Overall, a significant percentage of traders [Palm oil: (17 traders, 37.8%), Beans: (24 traders, 42.1%), Maize: (19 traders, 33.3%), Rice (12 traders, 21.1%,) did not perceive any harmfulness for the additives commonly used. This may be because of their demographic characteristics but further study is required.

5. Conclusion

In this study, the researchers have carefully examined the additives/preservation practices of raw food vendors in New Market and Old artisan markets of Enugu, Nigeria, with special interest in Palm Oil, beans, maize, rice, pawpaw, orange, banana (both locally produced and imported). Based on the responses of the respondents, the researchers concluded that the commonest practice for preventing palm oil spoilage was by Enugu metropolis traders was by addition of salt [21 traders (36.8%)], and for reddening their oil, addition of red food colour (tartrazine) [24 traders (42.1%)], while for improving the quantity of their palm oil, water was added [15 traders (26.3%)]. To improve taste, the commonest additive was salt [23 traders (40.4%)]. The commonest preservation method used for grains against weevil by Enugu metropolis traders is use of pesticides; beans [8 - 23 traders (14.0% - 40.4%)]. The commonest additive added in grains to prevent spoilage by Enugu traders is Aluminium Phosphide; [9 - 27 traders (15.8% - 47.4%)]. The commonest additive used by Enugu metropolis traders to ripen their fruits was Calcium carbide (3.4% - 19.0%). The commonest methods employed in

ripening fruits among Enugu traders was wrapping in an airtight polythene bag [4 - 29 traders (6.9% - 50.0%)]. Red paint was the commonest additive perceived to be harmful by palm oil traders (11, 19.3%). This is followed closely by Red food color tartrazine (8, 14.0%). DDVP was the commonest additive perceived to be harmful by most grain sellers [8 - 16 out of 57 respondents (14.0% - 28.1%)]. Calcium carbide was the commonest fruit additive perceived to be harmful by most fruit sellers [1 - 7 out of 57 respondents (1.7% - 12.1%)].

6. Recommendations

Based on the findings of this study the researchers recommended the following:

I. **For the Raw Food Traders:** Food poisoning in Nigeria is a serious issue as revealed by the study and this also occurs commonly due to the preservation practices employed by sellers. Most sellers are unaware of the harmfulness of the substances they use, therefore, there should be adequate sensitization of both the raw food vendors and general public on the need for safer food preservation practices as most people may be using these methods at the family level.

II. **To the Consumers:** Consumers should be more inquisitive and proactive in determining how safe the raw foods are before purchase and consumption as the widely proposed food security by the Food and Agricultural Organization (FAO) can only be fulfilled by this. Also, if consumers do not buy unsafe food, the traders will be forced to employ safer preservation methods.

III. **To the Raw Food Traders:** Food sellers should adhere strictly to the code and conduct guiding preservation of food for the public as respect for health and human life is paramount. Regular sensitization programs should be held by the government on the critical doses of food additives as well as the avoidance of the dangerous substances. Practical courses can also be organized.

IV. **To the Government:** The Federal government should collaborate with the state and local governments as well as other regulatory institutions in the area of capacity building in terms of manpower, infrastructure and logistics for effective risk analysis of food preservation methods employed and setting up of punitive measures.

V. **To NAFDAC:** There is a need for a tighter regulation guiding the use of additives in raw food preservation. Regular monitoring exercises should be conducted, and the defaulting traders should be made to face punitive measures.

Contribution to Knowledge

The burden of food poisoning and outbreak related to raw food additives and preservation practices grows bigger each day, and although it doesn't stand out like most communicable diseases, if we continually leave it unchecked, we may be dealing with a dangerous food crisis in the future. This study, therefore, discovered that a variety of harmful chemicals are employed in preserving raw foods from spoiling, and while their application forms the common practice, a large percentage of the traders are unaware of the negative effect they may have on health.

Area for Further Study

This study critically examined the raw food additives and preservation practices of traders selling Palm Oil, beans, maize, rice, pawpaw, orange, banana and observed that many

dangerous substances are employed by vendors who do not perceive them to be unsafe. Therefore, further research is recommended to determine the chemical residue levels in these foods. This is also required in the areas of raw food preservation practices at the family level as well as safer additives and preservation methods which can be employed sustainably in Nigeria or Africa.

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Conflict of Interest Statement

The Authors declare no conflict of interest as regards this study.

Ethical approval

Ethical Approval was obtained from the University of Nigeria Research Ethics Committee.

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