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Food Loss And Food Sensitivity: Evaluating The Impact On Food Security In Nigeria

Emmanuel-Ugbokodo., O.M.

Akintemi, A.O.

Osabiya, O.J.

Faculty of Applied Sciences, Department of Food Science and Technology and
Department of Science Laboratory Technology, Rufus Giwa Polytechnic,
Owo, Ondo State, Nigeria

Abstract: ***In other to improve food security in many countries of the world, it becomes highly essential to pay due attention to the issue of food losses in the fight against hunger and as part of efforts to increase income. Food sensitivity is also another field that has received minuscule attention in African countries since its effect on food security is yet to be quantified through dedicated research. These issues affect food security, food quality and safety, economic development and the environment as a whole. The types and causes of food losses depend on specific conditions and prevailing situations in each country. In general context, food losses is understood to be influenced by choices and patterns of crop production, internal infrastructure and capacity, marketing chains and distribution channels as well as consumer purchasing and food use practices. Measures aimed at minimizing food losses should however be considered no matter the level of economic development and maturity of systems in a country. Food safety as an integral part of food security has always been seen in the light of actions aimed at preventing foodborne diseases. This aspect has been showered with past and ongoing attention from governments of many nations however there is still a question of whether food can be regarded as safe if food sensitivity reactions occur after the consumption of such foods. This question therefore brings about a need for the evaluation of the impact of food sensitivity on food security of affected individuals. In order to proffer effective solutions to issues surrounding food security, there is need to invest in researches which will help identify not only current issues of food loss and food sensitivity but also provide a holistic science based approach to eradicating food insecurity.***

I. INTRODUCTION

Food which is one of the basic necessities of life has raised a lot of concerns in recent times for countries with teaming populations and insufficient availability of this commodity. A community that is 'food secure' can be defined as one where there is sufficient access to safe, nutritious and affordable food products. There is an imminent food crisis if any of the aforementioned aspects are compromised. Amongst the many factors that have been implicated to endanger the state of food security include the issues of Food Loss and Food Safety. Food loss according to FAO (2011) is the reduction in edible food mass throughout the part of the supply chain that is specifically meant for human consumption. On the other hand, food can be regarded as 'safe' when its consumption is not injurious to human health.

There is a need to focus research on food loss and food safety of plant commodities would be as there has been very limited research in these areas regarding their impact on food security. Plant commodity food losses may arise from divers causes amongst which are: mechanical damage and/or spillage during harvest operation; losses due to spillage and degradation during handling, storage and transportation between farm and distribution; industrial or domestic processing losses; and waste in the market system and house hold levels (FAO, 2011). A case by case study approach

should be adopted in terms of evaluating extent of impact on food security to include food losses brought about as a result of spoilage in wet market systems as this is the readily accessible source for food procurement in the country. Food safety also being an integral part of food security should also be of interest however, it has always been seen in the light of actions aimed at preventing foodborne diseases. This aspect has been showered with past and ongoing attention from governments of many nations however there is still a question of whether food can be regarded as safe if food sensitivity reactions occur after the consumption of such foods. Although it has become common knowledge that only a few population suffer from this types of reactions, the impact on the food security of the affected population should not be overlooked as this would place diet restrictions on them thereby eliminating their utilization of such foods for edible consumption. There is also limited information on the prevalence of food sensitivity in Nigeria.

The aim and focus of this paper is to illuminate the reasons for: quantifying the current rate of food losses in wet markets within Nigeria as a result of microbial and other forms of spoilage; determination of food sensitivity prevalence in the country; and measuring the impact of these two factors on food security as paramount to the improvement of food security in Nigeria.

II. FOOD LOSS

According to FAO (2011), "Food losses represent a waste of resources used in production such as land, water, energy and inputs. Producing food that will not be consumed leads to unnecessary CO_2 emissions in addition to loss of economic value of the food produced".

Food waste usually refers to discarded, lost, and degraded or pest consumed edible food products, which were originally intended for human consumption. This usually occurs at the end (i.e. within retail and final consumption) of the supply-chain representing a higher value-chain potential and also increased costs if used for purposes other than human consumption. Food waste however does not include portions of food stuff that are inedible or undesirable. Food waste may be more correctly referred to as food loss if it occurs during the early stages of the food supply-chain such as during production, storage, transportation and processing (Bond, Meacham, Bhunnoo and Benton, 2013).

A. TYPES AND CAUSES OF FOOD LOSS / WASTE

The typical causes for food waste in developing countries (e.g. Nigeria) have been attributed to the following (Bond, Meacham, Bhunnoo and Benton, 2013):

- ✓ Pre-harvest losses due to weather conditions that are extreme, pest infestation, plant diseases and weeds, crop varieties with decreased resilience, poor soil quality and water shortages;
- ✓ Poor agricultural production practices;
- ✓ Labor limitations as a result of missed educational opportunities and high ill-health incidences (e.g. HIV/AIDS);
- ✓ High animal mortality rate due to substandard welfare and occurrence of disease;
- ✓ Early harvesting due to unfavorable weather conditions and efforts to reduce hunger and poverty;
- ✓ improper and inadequate post-harvest handling and storage conditions;
- ✓ Inadequate processing facilities;
- ✓ Poor market networks and low private sector investment

The types of food loss / waste as classified by FAO (2011), is summarized in Table 1 following the five system boundaries in the food supply chains of plant and animal commodities and products.

Food Supply Chain System Boundaries	**Type of Food Commodity / Product and Loss**	
	Plant	**Animal**
Agricultural production	Mechanical damage and/or spillage during harvest operation (e.g. threshing or fruit picking), sorting of crops after harvest, etc.	Animal death during breeding, discards during fishing, and decreased milk production due to animal sickness (e.g. mastitis).
Post-harvest handling and storage	Spillage and degradation in the process of handling, storage and transportation between farm and distribution.	Death during transport to slaughter and condemnation at slaughterhouse, spillage and degradation during icing, packaging, storage and transportation after landing and spillage and degradation during transportation between farm and distribution in the case of milk.
Processing	Spillage and degradation during industrial or domestic processing, e.g. juice production, canning and bread baking. Losses may occur when crops are sorted out if not suitable to process or during washing, peeling, slicing and boiling or during process interruptions and accidental spillage.	Trimming spillage during slaughtering and additional industrial processing (e.g. sausage production), losses resulting from industrial processing such as canning or smoking, spillage during industrial milk treatment (e.g. pasteurization) and milk processing (e.g., cheese and yoghurt).
Distribution	Waste in the market system	Waste in the market system (e.g. wholesale

	(e.g. wholesale markets, supermarkets, retailers and wet markets).	markets, supermarkets, retailers and wet markets).
Consumption	Waste during consumption at the household level.	Waste during consumption at the household level.

Table 1: Types of Food Commodity / Product Loss

B. FOOD WASTE IN THE MARKET SYSTEM

According to table 1 above, the market system has been segmented into four categories which are the: wholesale markets; supermarkets; retailers; and wet markets. However, the wet market system alone will be discussed as this represents where majority of the county's populace source food. Wet markets are markets that sell fresh meat and farm produce differing from dry markets that sell durable commodities such as fabrics and electronics (The Guardian, 2009). These markets are open and have been implicated as a source of food borne diseases in some countries. The openness and unregulated (i.e. limited or no specific food safety and hygiene practices, code of conduct or requirement by law) nature of these markets predisposes the foods sold therein to microbial contaminations of all sorts thereby leading to both high potential of spreading illness as well as premature spoilage of the produce sold causing loss (either financial or otherwise) on the end of both the seller and the customer. The spoilage of fresh vegetable farm produce is of main interest as they are highly perishable and would contribute to most of the food waste generated in these markets in many African communities. Spoilage of food is brought about by metabolic processes that render the food undesirable or unacceptable by the consumer as a result of changes in the organoleptic characteristics (i.e. texture, smell, taste, or appearance). Although, a spoiled food may not necessarily cause disease if pathogens and/or their toxins are absent, however, the undesirable nature will cause it to be rejected which would invariably have considerable environmental and economic effects on the community. It has been determined that a 20% loss of a crop also means 20% loss of the fertilizer and irrigation water used to grow the crop (Doyle, 2007). It is hereby essential to device ways of extending the shelf lives of the produce as it will also impart on the state of food security. Shelf life refers to the period of time in which a food remains stable and its desirable qualities are retained. Below are some causative factors that have been implicated in food spoilage:

- ✓ Oxidation of phenolic compounds and degradation of pectin by endogenous enzymes in plants.
- ✓ Rodents, parasites and insects infestation of foods
- ✓ Microbial action
- ✓ Photo-degradation of pigments, fats and proteins and photo-stimulation of pigment production.
- ✓ Temperature, air and moisture

The above factors are interrelated as the endogenous enzymes and microbial activities depend on temperature, oxygen and moisture levels. Damage caused by insects and rodents also creates an entry point for microbial proliferation (Doyle, 2007). Food is a carbon and energy source for a variety of microorganisms which includes the: prokaryotes, eukaryotes, yeasts and molds. Some microbes have been known to generally utilize most foods as carbon and energy source while some are food specific. Many organisms may be isolated from a single spoiled food even though there is only one culprit responsible for the spoilage; these are referred to as 'Specific Spoilage Organisms'. A food undergoing spoilage may also have different succession of microbial population at different stages of spoilage due to the availability or exhaustion of different nutrient types. Some organisms also produce substances that inhibit other microbes that are competing for nutrients (Gram *et al*., 2002). Spoilage organisms are found in soil, water, and intestinal tracts of animals and may be dispersed via air, water and small animals (e.g. insects) (Doyle, 2007).

C. FOOD SENSITIVITY PREVALENCE IN NIGERIA

Current available data on the prevalence of food allergy in Nigeria is very limited. 28% of respondents in a study conducted in Rivers State, Nigeria documented self-reported allergies to a variety of foods such as; seafood (14.7%), cereals/legumes (11.4%), vegetable oil (1.1%) and pork (1.6%) (Achinewu, 1983). In a review by Mbugi and Chilongola, allergy prevalence rate of 20% to 30% in Africa was reported and suggestion was made that issues of allergy are as important as other highly morbid conditions which include human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS), malaria and tuberculosis. Recommendations were made to prioritize problems of allergy and allergens and that in order to properly determine prevalence rates in Africa, further research needs to be carried out using larger sample sizes (Mbugi and Chilongola, 2010).

III. CONCLUSION

Carrying out research into food losses and food sensitivity within Nigeria will help to:

- ✓ Provide a current situation report in the study areas of interest regarding issues of food loss due to spoilage.
- ✓ Provide information on current food sensitivity incidences in the chosen study areas.
- ✓ Provide information on the impact of food wastage and food sensitivity on the food security of participants.
- ✓ Develop possible solutions and make recommendations for improvement based on research outcomes.

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