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## Current Position of Sanitation in Nigerian Food Industries

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**Abstract:** Evaluation of conformity of major commodity food industries to sanitation standards was carried out. Major fourteen food industries were investigated include dairy industry, bakery, beverage factory, fish processing industry, brewery, cereal processing and fruit canning industry. The survey shows that most Nigerian food industries were designed, constructed and operated without sufficient consideration for many important sanitary factors and without adequate facilities of the right kind or the type of conditions which would promote good personal hygiene and impeccable plant sanitation. Few of the industries performed satisfactorily in some of the area investigated while four companies attained the minimum standard specified in this survey on all overall basis. Much more attention needs to be paid to rodent and pest control, water treatment, waste disposal and utilization.

**Key words:** Sanitation standard, food industries, food quality

### INTRODUCTION

Food meant for human and animal consumption should be produced under conditions of cleanliness and sanitary decency. No consumer would knowingly wish to consume food products that has been canned, dried or processed in a rodent infested, insect ridden, filthy or bacteriologically unclean factory. Clean food shouldn't be processed in dirty equipment and surroundings.

Good plant sanitation often reduces loss due to bacterial spoilage, mould, fermentation, insect infestation and rodent contamination. G.W. Harrison defined food sanitation as "A system or a set of system for ensuring that food is prepared, manufactured, stored, distributed and sold under the cleanest possible conditions and with an absence of avoidable contamination (Harrison, 1976).

According to the definition given by the National Canner Association Research Laboratory of America, sanitation has been defined as "The planned maintenance of the work and product environment to prevent or minimize hazard of product contamination and conditions aesthetically offensive to the consumer and to provide healthful and safe working conditions" (NCARL, 1968).

Parker and Litchfield have broadly defined sanitary practice in food industry as "the systematic control of environmental conditions during the transportation, storage and processing of food in such a manner that their contamination by micro organisms, insects, rodents or other animals pests and by foreign chemical materials can be prevented" (Parker and Litchfield).

There seems to be so many specific sanitation problems in food business such as insanitary methods of transporting perishable foods (e.g. meat and fresh vegetables), inadequate and inappropriate storage facilities, filthy markets, squalid abattoirs, exposure of raw and cooked foods to surroundings of deplorable

sanitation and the commercial processing of food in unhygienic plants, give much concern for responsible food scientists, food technologist, health authorities and discriminating consumers.

The National Agency for Food and Drug Administration and control (NAFDAC) is the legal Agency in Nigeria that enforces the Food and Drugs Decree of 1974 which made the following provisions for the regulation of the manufacture, sale and advertisement of food:

#### It prohibits the sale of any food which:

- (i) Has in it or upon it any poisonous or harmful substance not being a food additive or contaminant of a type and within the level permitted by regulation/make under this Decree.
- (ii) Is unfit for human consumption.
- (iii) Consists in whole or in part of any filthy, disgusting, rotten or diseased substance.

The penalties for successful prosecution are severe and legal action can sometimes be taken (Harrison, 1973).

### MATERIALS AND METHODS

**Investigation:** An investigation was carried out on many aspects of plant sanitation using the inspection technique recommended by Parker and Litchfield (Ossai *et al.*, 1984-85). Sanitation evaluation format for the purpose of the investigation was prepared in order to avoid overlooking pertinent details.

Major commodity food industries such as meat processing factories, dairy industries, bakeries, soft drink factories, cereal processing factories, beverage factories, fish processing factories and fruit canning industries were evaluated.

Codes (C.1, C.2, C.3, etc) rather than actual company names have been used for known facts.

Numerical scores were given to sanitary observations on a 9 point hedonic.

Scales: 9-Extremely good, 8-Very good, 7-Good, 6-Fairly good, 5-Neither good nor bad, 4-Fairly good, 3-Bad, 2-Very good, 1-Extremely bad.

Great pain was also taken to make sure the score was as accurate as possible. Percentage score on each main items evaluated was calculated. A score below 75% was considered unsatisfactory for a food industry because the maintenance of a sound sanitary practice is important to the production of high quality and safe products.

## **RESULTS AND DISCUSSION**

Table 1 shows the percentage scores on all the plants evaluated for sanitation and indicates the degree to which the selected food industries conform to standard sanitary practice.

**Factory surroundings:** Most of the industries visited were not located in swampy or heavily wooded areas or near centers of pollution. The plant surroundings were generally clean. All the industries visited were either located close to residential areas or office complexes which often harbored a large number of rodents. Refuse dumps, swamps and woods are detrimental to the sanitary interests of food industries; Insects, rodents and reptiles normally comes from such environments which ought to have been avoided at the early stage of the search for a site.

Normal drainage facilities were inadequate in C5 and C7 which were water logged during my visit. All the industries effected a measure of dust control by properly cementing land surrounding process areas but C1, C2, C5, C7, C8 and C11 kept empty drums, metal pipes and unused planks in their premises which constitute an eye sore for the factory surroundings.

**Factory buildings:** The industries were mostly of single storey construction and high enough to allow the use of fork lift trucks. This facilitates free and direct flow of raw materials and equipments. The breweries and flour mills were in necessity, multi storey. There were no false ceilings except in C7 which can harbor rodents and reptiles and also allows for mould growth. The walls had smooth surfaces. Five of the industries had their walls tiled a reasonable distance from the floor to facilitate cleaning. Some of the walls were painted in light colour which would aid the reflection of light.

If the humidity was high in such factories the paints could peel off (The Federal Military Government of Nigeria, 1974) as was observed in two of the industries. Except for C5, cracks and crevices, which tend to harbor insects and encourage microbial growth, were generally absent. The factory floors were constructed of impervious materials. The floors of seven of the

industries showed evidence of wear. This was were prominent in the fruit processing and baking industries due to the effect of fruit acids and dragging of baking pan on the floor. Floor slopes were generally adequate and led to drains, most of which were covered. However, exit of the drains to the outside were unscreened in all cases. The junction between wall and floors were not coved. Pipes were laid in such a manner as to make dismantling easy.

Ventilation was largely adequate except in C7 and C11. This would help minimize heat stress on workers and reduce, moisture condensation, thereby reducing mould growth. All the industries had windows, the sills of which were not sloped to minimize dust accumulation. Only C7 had fly screens on its windows and doors to protect the process areas from insects. Lighting was generally adequate in the process areas but not so in the storage areas. Adequate and appropriate lighting in food plant is essential for the efficient cleaning and sanitizing of food equipment and machinery. Adequate lighting is also necessary for good general cleaning, for measurement, reading, color comparisons, labeling and for the inspection of raw materials and finished products (Parker and Litchfield, 1962).

**Water supply:** In the food industries investigated water obtained either from the river, boreholes or municipal water sources. There was an encouraging awareness in most of the industries of the need to use potable water in their processing. Ten of the industries had water treatment units except C2, C3, C7 and C11 had none.

**Ware house:** All the industries had ware houses where finished products were kept. Most of the industries ware houses were well illuminated and kept well clean while C5 and C14 did not keep their ware houses clean and tidy. The untidiness of these ware houses might cause contamination of products through rodents and insects as well as reptiles. On a general note, the ware houses were kept in good conditions for most of the industries.

**Waste disposal:** Waste disposal as well as its utilization, received sufficient and necessary attention in ten industries except in C2, C3, C7 and C11. Liquid wastes were channeled out of the factory premises without treatment into streams or into public drainage system. Most of the industries employed the services of waste disposal contractors. Only a few of the industries put their wastes into profitable use, for instance, a vegetable oil processing company sold all its solid waste as livestock feed.

**Facilities for employees:** None of the industries had all the essential facilities recommended for workers in the food industry. None of the industries had hand-washing

Table 1: Sanitary status of some major food industries in Nigeria

Food factory	FS	FB	DRR	C	FA	WH	WD	FE	T	RIC	CP	PA	WS	EPH	OA
C1	52	63	69	40	30	69	75	51	59	57	80	75	70	50	60.35
C2	49	69	64	85	75	70	65	60	62	62	67	77	35	60	64.29
C3	57	60	59	70	75	70	54	71	76	48	59	70	40	65	62.29
C4	78	75	69	71	79	77	79	69	75	56	77	76	64	69	72.43
C5	45	49	65	75	79	60	78	54	82	35	58	40	75	57	60.71
C6	82	77	74	79	80	69	78	65	79	67	75	74	76	76	75.07
C7	40	45	20	75	75	62	59	69	80	67	62	42	45	41	56.57
C8	65	80	69	77	82	73	80	81	81	74	62	85	73	72	75.21
C9	77	81	79	84	81	75	77	70	84	72	69	80	65	74	76.29
C10	76	79	71	78	84	75	80	69	80	79	70	67	75	69	75.14
C11	54	45	20	54	35	69	56	45	77	45	62	54	40	47	50.21
C12	78	76	60	72	70	74	84	76	75	42	64	54	75	60	68.57
C13	75	75	70	76	82	72	76	68	77	62	78	76	77	65	73.5
C14	65	77	64	78	38	62	74	55	76	37	59	67	70	69	63.64

FS = Factory Surroundings  
FA = First Aid  
T = Toilet  
WS = Water Supply

FB = Factory Building  
WH = Ware House  
RIC = Rodent and Insect Control  
EPH = Employer's Personal Hygiene

DRR = Dressing and Rest Rooms  
WD = Waste Disposal  
CP = Clean up Procedures  
OA = Overall Acore  
C = Cafeteria  
FE = Facilities for Employees  
PA = Processing Area

facilities in the process area except C6 and none provided soap for hand-washing and no towels for hand drying.

**Toilet:** All the industries provided toilet facilities for their staff. Some of the toilets had their floors and walls tile. The toilets in C1 and C2 were not so clean but all others were clean. No soap was provided in the industries except in C6 and means of drying their hands was also not provided. Liquid and hot air drying device can be substituted for tablet soap and hand towels as the excuse given by most of the company's management is that the tablet soap was been taken away by employees. During normal operations hands become soiled with a wide variety of contaminants. Hand is probably one of the most common vehicles for transmitting contamination of food and food contact surfaces. Harwood and Minch (1951), investigated the number and types of bacteria found on the hands of food handlers. They identified a large number of coliform organisms in addition to other bacteria. It is therefore essential that hands be washed thoroughly at frequent intervals during the working day, most especially after each visit to the toilet.

**First aid:** First aid facilities were provided in all the companies except C1, C7, C11 and C14. Most of the companies' first aid facilities were handled by untrained attendant except C6 and C10.

**Dressing and rest rooms:** C7 and C11 had no dressing rooms for their employees. In all the other factories dressing rooms were close to the toilets and washrooms and equipped with fairly clean ventilated lockers. Personal clothing can be a source of food contamination. It is therefore, desirable to have workers

routinely change into clean factory uniforms at the beginning of each day's operation.

**Cafeteria:** Most of the industries had cafeteria and cleaning was unsatisfactory. None used the three stages cleaning procedure of soaking and sterilization. Impeccable hygiene should be maintained in all aspects of cafeteria services. Dirty uniforms and habits must not be tolerated.

**Employee's personal hygiene:** All the industries provided uniforms, some provided caps in addition. However C7 and C11 did not provide uniform for their employees. Nose picking and smoking were not noticed in any of the fourteen industries investigated. There was also no evidence of illness. It should be noted that insanitary and unsightly habits, apart from their contamination potentials, may adversely affect confidence in the industry.

**Rodent and insect control:** Premises which are badly designed and managed are ideal for the development of infestations of many types. C5, C7, C10, C11, C12 and C14 did not maintain their premises well. Their surroundings were bushy which gives room for rodent infestation. No infestation should be tolerated in food premises. It is not possible to comply with the guide and to produce a consistently uncontaminated product if insects, rodents or birds are present.

**Clean-up procedures:** Most of the companies visited had a good cleaning procedure. C1, C4, C6, C8, C10, C13 use clean-in-place system. This makes for efficient cleaning of their equipment both internally and externally.

**Sanitary condition of process areas:** The processing area of C1, C2, C4, C8, C9 and C13 were sparkingly

clean, most of them are either producing dairy related products or breweries. C5, C7 and C12 were particularly dirty. C5 was not well planned and raw materials were stored in the process area.

**Conclusion:** From Table 1, only about four companies (C6, C8, C9 and C10) maintained high sanitary standard. Six out of the fourteen industries maintained their factory surrounding very well. Eight of the industries also designed and build their factory in conformity with hygienic standards.

In particular, none of the companies satisfied the minimum standard of sanitation in the area of facilities for employees while only one company satisfy minimum standard in the area of rodent and insect control. Also in the area of personal hygiene of employees, only C6 which is a dairy industry satisfy the minimum sanitary standard. The food factory workers in Nigeria therefore appear to be neglected in terms of facilities and their level of personal hygiene is very low. It is evident that the entire company's except one make little effort to control rodents and insects. This may have undesirable or, perhaps, deleterious consequences on the quality of their products and the health of the consumers (Olunlade *et al.*, 2008).

Finally, much more attention need to be paid to rodent and insect pest control, water treatment, waste disposal and utilization. The condition of sanitation in most food industries is therefore very bad and demands considerable and urgent improvement.

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