

## **Dietary Pattern, Nutritional and Health Status of Inmates in Ibara Prison, Abeokuta, Ogun State, Nigeria**

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**Abstract:** In a situation whereby one is deprived of freedom and liberty, choices of food become impossible, making dietary pattern monotonous and resulting into nutritional deficiencies of essential nutrients. Thus this study assessed the dietary pattern, nutritional and health status of inmates in Ibara prison, Abeokuta, Ogun State, Nigeria. Dietary pattern, nutrient intake and health status were assessed using food frequency questionnaire, 24-hour diet recall and general health status questionnaire respectively. Nutritional status was assessed by calculating the Body Mass Index (BMI) of the respondents and was categorized using WHO Body Mass Index classification. Descriptive (mean, frequency count, percentage), Pearson correlation was used to establish relationship between variables. Results showed that majority of the respondents met over 70% of their RDA for energy and most nutrients. More than two-third (67%) of the respondents had BMI within the normal range, 21% were underweight and 11% were overweight. The respondents consumed more of root and tubers, legumes and cereals. About 37.5% of the respondents perceived their health as good. There was a significant relationship between BMI and Health Perception ( $p = 0.001$ ,  $R^2 = 0.057$ ). Poor dietary pattern and nutritional status were some of the major issues faced by inmates.

**Key words:** Dietary Patterns • Inmates • Nutritional Status • Body Mass Index • Health Status

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### **INTRODUCTION**

Food plays a major role in the life (Physical, mental, nutritional and emotional wellbeing,) of inmates. Unfortunately, majority of prison inmates diet in is determined for them as they do not have the freedom to decide what to eat and when to eat, thereby making them consume whatever is given to them which in most cases are poorly designed, inadequate in portion sizes and lacking in varieties [1]. This kind of lifestyle makes their dietary patterns monotonous, lacking diversification of diet and resulting into inadequate supplies of some essential nutrients [2].

Inmates are held in an institution such as prison or jail, they have no control over their environment [3] and the kinds of food they eat. In a situation whereby one is deprived of freedom and liberty, choices of food become impossible, making dietary pattern monotonous and resulting into nutritional deficiencies of essential nutrients, i.e. some nutrients may become excess or insufficient thereby ensuing into over-nutrition or under-nutrition [4].

According to World Health Organization (WHO), the major health risks associated with prisoners are malnutrition, HIV/AIDS, tuberculosis and mental disorders. This is secondary to inadequate dietary intake, poor feeding practices, unhygienic environment, lack of basic amenities etc. [5]. A study conducted in selected prisons in Tanzania by Musa [3] revealed that 38.3% of the inmates were HIV-infected, 6.6% were under-weight, 62.7% were anemic and while 30.9% were either over-fat or obese. In addition, a research conducted on inmates in Oyo state, Nigeria reported that average calorie intake of inmates was 4415 kcal while average intake of protein was 36g per day. This reveals a higher intake of energy but low intake of protein [6]. No enough researches on food intake and nutritional status have been conducted on inmates in Nigeria. Thus, this research was used to provide information on the dietary patterns of inmates in Ibara Prison, Abeokuta, Ogun State, as well as their nutritional and health status and help plan nutrition support for inmates in Ibara Prison, Abeokuta Ogun State and other prisons in Nigeria.

## MATERIALS AND METHODS

**Study Design:** This study was a cross sectional study among the prisoners at Ibara Prison, Abeokuta, Ogun State.

**Study Area:** This study was carried out at the Nigerian Prisons Service, Ibara, Abeokuta South Local Government Area, Ogun State. The prison is also referred to as Ibara maximum prison because it is the major and most populated prison in Ogun State. It was established in the year 1900 and has a capacity of 510 inmates. Currently the prison has a population of 1058 inmates with 1003 being male and 55 being female. Among these inmates, 611 males and 41 females are awaiting trial, while 113 males and 11 females are convicted.

**Study Population:** The population was male and female prisoners in Ibara Prison, Abeokuta, Ogun State.

**Sample Size Determination:** The sample size 'n' required for the study was estimated from the formula:

$$n = \frac{N}{1 + N(e^2)} [7]$$

where n = sample size; N = population size = 1058 (Preliminary survey at Ibara Prison, 2017): unpublished data; e = margin of error (7% or 0.07)

$$n = \frac{1058}{1 + 1058(0.07)^2}$$
$$n = 171.1$$

However, the sample size was rounded up to 200 respondents in order to account for non-responses.

**Sampling Technique/Procedure:** A stratified random sampling technique was employed in obtaining samples in a proportion of 190 males and 10 females.

**Inclusion Criteria and Exclusion Criteria:** Inmates who had stayed in the prison for at least four weeks before the study and those who consented to partake in the research were included. While inmates were excluded if their stay was below four weeks as at the time of the research, if they did not consent to partake in the study and if they were critically ill.

**Methods of Data Collection:** A structured questionnaire was used to obtain data on socio-demographic characteristics, dietary patterns using food frequency questionnaire and nutrient intake using 24-hour diet recall. The Anthropometric measurements of the respondents were taken using calibrated bathroom weighing scale and height meter. A self - reported questionnaire was used to obtain information on the health status of the respondents.

**Data Analysis:** The data was analysed using SPSS, version 20.0. WHO Body Mass Index cut-off points was used to assess prevalence of malnutrition. Total Dietary Assessment software was used to estimate the nutrient intake of the respondents, while correlation analysis was used to evaluate the relationship between the nutritional status and health status of the respondents.

## RESULTS AND DISCUSSION

Table 1 shows the socio-demographic information of the respondents. Majority of the respondents (90%) were male. This result affirmed the finding of Ghana Prisons Service annual report [8] who recorded that 98.3% of the average daily convicts' population for the reporting year were males while the females were 1.7% which implies that males engage in riskier behaviour than females. High percentage of male prisoners affirms the truth that males are typically more openly aggressive than females, who usually tend to show their aggression in less overt and less physical ways [9]. The respondents 70% were predominantly young adults (18-35 years). In a similar study by Godden [7] 94% (N=187) of the inmates were young adults. Having such age group in prisons may truncate the economy of a country because individuals in such age group are energetic, active and may contribute to the development and productivity of the country [3]. Also, imprisonment at a young age leads to future economic hardship as a results of lower levels of mental well-being, physical health, social attachments and a lower life expectancy [10]. Half of the respondents (50%) had secondary education and only few (28%) had tertiary education. These results also support findings by Musa [3] who reported that majority of the respondents had primary education level and only a few had college and vocational education. The study also established the fact that education level has a direct relationship with crime in the society, as an increase in an education level led to

Table 1: Socio-demographic information of Respondents

Variables	Frequency	Percentage (%)
Sex		
Male	190	95.0
Female	10	5.0
Total	200	100
Age		
19-24	28	14.0
25-30	56	28.0
31-36	56	28.0
37-42	35	17.5
43-49	18	9.0
>50	7	3.5
Total	200	100
Religion		
Christianity	103	51.5
Islam	91	45.5
Traditional	6	3
Total	200	100
Education		
No Education	9	4.5
Primary Education (completed)	27	13.5
Primary Education (not completed)	8	4.0
Secondary Education (completed)	78	39.0
Secondary Education (not completed)	22	11.0
Tertiary Education	56	28.0
Total	200	100
Source of support		
Yes	144	72.0
No	56	28.0
Total	200	100.0
Kind of support		
Visitors	9	4.5
Families	96	48.0
Friends	12	6.0
Church	1	0.5
Friends and families	15	7.5
Visitors and families	6	3.0
Visitors and friends	1	0.5
Visitors, friends and family	4	2.0
No support	56	28.0
Total	200	100.0
Charge		
Adoption	4	2.0
Assault	4	2.0
Attempt to rob	3	1.5
Conspiracy	1	0.5
Cultism	11	5.5
Fighting	2	1.0
Fraud	12	6.0
Theft	23	11.5
Man slaughter	9	4.5
Murder	37	18.5
Obtaining under false pretence	14	7.0
Rape	21	10.5
Robbery	57	28.5
Unlawful possession	1	0.5
Not disclosed	1	0.5
Total	200	100

Table 2: Mean Energy and Nutrient Intake of Respondents

Nutrients	Mean	Male RDA (% Met)	Female RDA (% Met)
Calorie (kcal)	1794.0	2500 (71.8%)	2000 (89.7%)
Protein (g)	51.2	56 (91.4)	46 (111.3)
Carbohydrate (g)	257.5	130 (198.1)	130 (198.1)
Fiber (g)	10.9	31 (35.3)	25 (43.8)
Fat (g)	34.67	ND	ND
Vitamin B <sub>2</sub> (mg)	0.64	1.3 (49.2)	1.1 (50.2)
Vitamin B <sub>3</sub> (mg)	8.43	16 (52.7)	14 (60.2)
Folate (mcg)	210.9	400 (52.7)	400 (52.7)
Vitamin B <sub>12</sub> (mcg)	2.5	2.4 (105.4)	2.4 (105.4)
Calcium (mg)	320.1	1000 (32.1)	1000 (32.1)
Phosphorus (mg)	498.8	700 (71.3)	700 (71.3)
Potassium (mg)	882.6	4700 (18.8)	4700 (18.8)
Zinc (mg)	9.3	11 (84.9)	8 (116.8)
Iron (mg)	29.0	8 (362.9)	18 (161.3)
Magnesium (mg)	142.5	400 (35.0)	300 (47.5)

ND = Not determinable due to lack of data of adverse effects in this age group and concern with regard to lack of ability to handle excess amounts. Source of intake should be from food only to prevent high level of intake. RDA Source: Institute of Medicine, Food and Nutrition Board, National Academies, [14].

decrease in probability of engaging in crime which is due to the increase in awareness and economic independence [11]. Most of the inmates were charged for robbery (28.5%) and murder (18.5%). In a similar research conducted by Richard [12] most of the inmates were arrested for engaging in serious and violent conduct with theft being the predominant amongst the inmates. According to Soh [13] urbanization and industrialization contributes to engagement in crime commission which is one of the major world's social problems.

Table 2 shows the nutrient intake of the respondents. Result revealed that the average energy intake of the respondents (1794 kcal) was below the Food and Nutrition Board; Institute of Medicine recommended daily allowance. These result contradicted findings by Akinlotan *et al.* [6] who observed that, average calorie intake of inmates was 4415 kcal. However, respondents had a high percentage fulfilment (198.1%) for their daily carbohydrate. Result also revealed that respondents' mean nutrient intake did not meet up with the recommended daily allowance for some nutrients such as vitamin B<sub>2</sub>, folate, calcium, vitamin B<sub>3</sub>, phosphorus, potassium and magnesium. This confirmed studies by Latham [15] and Young and Gherardin [16] who established the fact that carbohydrate provided 70 percent or more of the energy intake of the population in developing countries where poverty is endemic, in contrast to industrialized countries where it contributes about 45-50% of their energy intake. According to FAO [17] energy is needed for several functions of the body such as respiration, circulation, physical work and maintenance of core body temperature.

Table 3 shows the frequency of consumption of different food items in each food groups. Majority (Over 70%) of the respondents consumed more of cereal groups but little fruits and vegetables, meat and poultry groups. This result is similar to the findings by Musa [3] who conducted research on the nutritional assessment of inmates living with HIV/AIDS in selected prisons in Tanzania where over 90% (N=768) of the inmates consumed cereals and legumes seven days a week, while consumption of fruits and vegetables as well as meat and meat products were generally low. White rice formed the major part of the respondents' daily consumption as 74% of the respondents consumed white rice 1-3 days a week and 38% consumed it 4-7 days a week. Staple foods contain about two-thirds water, have less protein content and lower contents of minerals and vitamins [18]. According to Dolan *et al.* [2] consumption of only one staple food for a long time without diversifying with other types of foods can lead to malnutrition. About 23% of the respondents did not consume beef at all and more than half of the respondents (56.5%) consumed beef 1-3 days a week. Regarding dairy products consumption, about 37% of the respondents consumed no milk at all and more than half of them (53.5%) consumed milk 1-3 days a week, while consumption of cheese and yoghurt were generally low as over 80% of the respondents consumed none in a week. Foods of animal origin are useful complements to most diets and supply animal protein, especially to prisoners whose diets are based on carbohydrate-rich staple foods such as maize [19]. The consumption of fruits and vegetables by the respondents were generally low as only one particular fruit (orange) was the commonly consumed fruit among the inmates. This was consumed by about 57% of the respondents for 1-3 days a week, while only 6.5% of the inmates consumed orange 4-7 days a week. Consumption of other fruits like mango, pawpaw, guava, pineapple, golden melon and cashew were very low as over 75 % of the respondents consumed none of them in a week. The importance of fruits cannot be overemphasized as they usually contain very little fat or protein and usually no starch [20]. As regards vegetables consumption, tomatoes and pepper were the majorly consumed vegetables as over 90% of the respondents consumed both, while intake of vegetables such as carrot, cabbage, garden egg, pumpkin and cucumber were really low as over 75% of the inmates consumed none of them in a week. High intakes of fruits and vegetables can also reduce the risk of coronary heart disease and some cancers [21].

Table 3: Food Consumption Pattern of Respondents

Food Group	Never Frequency (%)	1-3 Days per Week Frequency (%)	4-7 Days per Week Frequency (%)
<b>Cereals</b>			
Maize	147 (73.5)	43 (21.5)	10 (5.0)
Maize pap	97 (48.5)	93 (46.5)	10 (5.0)
Eko /Agidi	152 (76.0)	48 (24.0)	0 (0)
Tuwomassara	178 (89.0)	21 (10.5)	1 (0.5)
Corn flakes	115 (57.5)	80 (40.0)	5 (2.5)
Golden morn	161 (80.5)	36 (18.0)	3 (1.5)
White rice	8 (4.0)	116 (74.0)	76 (38.0)
Jollof rice	75 (35.0)	118 (59.0)	12 (6.0)
Fried rice	178 (89.0)	21 (10.5)	1 (0.5)
Coconut rice	198 (99.0)	2 (1.0)	0 (0)
Wheat	158 (79.0)	37 (18.5)	5 (2.5)
Wheat bread	182 (91.0)	16 (8.0)	2 (1.0)
Semolina	125 (62.5)	64 (32.0)	11 (5.5)
Pasta	96 (48.0)	89 (44.5)	15 (7.5)
Sorghum	197 (98.5)	3 (1.5)	0 (0)
<b>Meat and poultry groups:</b>			
Flesh	46 (23.0)	113 (56.5)	41 (20.5)
Organ meat- heart	175 (87.5)	16 (8.0)	9 (4.5)
-liver	167 (83.5)	22 (11.0)	11 (5.5)
-kidney	178(89.0)	14 (7.0)	8 (4.0)
-intestines	148 (74.0)	39 (19.5)	13 (6.5)
Hide (Ponmo)	73 (36.5)	104 (52.0)	23 (11.5)
Chicken	158 (79.0)	41 (20.5)	1 (0.5)
Turkey	179 (89.5)	20 (10.0)	1 (0.5)
Egg	31 (15.5)	138 (69.0)	31 (15.5)
Pork	197 (98.5)	3 (1.5)	0 (0)
Bush meat	184 (92.0)	13 (6.5)	3 (1.5)
Goat meat	184 (92.0)	16 (8.0)	0 (0)
<b>Dairy:</b>			
Milk	74 (37.0)	107 (53.5)	19 (9.5)
Cheese	191 (95.5)	8 (4.0)	1 (0.5)
Yoghurt	176 (88.0)	20 (10.0)	4 (2.0)
<b>Vegetables:</b>			
Tomatoes	6 (3.0)	69 (34.5)	125 (62.5)
Okra	138 (69.0)	57 (28.5)	5 (2.5)
Carrot	163 (81.5)	35 (17.5)	2 (1.0)
Cabbage	193 (96.5)	5 (2.5)	2 (1.0)
Pepper	8 (4.0)	30 (15.0)	162 (81)
Garden egg	174 (87.0)	22 (11.0)	4 (2.0)
Pumpkin	151 (75.5)	42 (21.0)	7 (3.5)
Water leaf	68 (34.0)	122 (61.0)	10 (5.0)
Bitter leaf	117 (58.5)	77 (38.5)	6 (3.0)
Cucumber	158 (79.0)	40 (20.0)	2 (1.0)
Ewedu	88 (44.0)	101 (50.5)	11 (5.5)
Spinach	61 (30.5)	44 (22.0)	95 (47.5)
<b>Fruits:</b>			
Orange	73 (36.5)	114 (57.0)	13 (6.5)
Mango	166 (83.0)	33 (16.5)	1 (0.5)
Pawpaw	152 (76.0)	46 (23.0)	2 (1.0)
Guava	195 (97.5)	4 (2.0)	1 (0.5)
Pineapple	164 (82.0)	36 (18)	0 (0)
Apple	127 (63.5)	67 (33.5)	6 (3.0)
Grape	193 (96.5)	7 (3.5)	0 (0)
Water melon	104 (52.0)	82 (41.0)	14 (7.0)
Golden melon	182 (91.0)	17 (8.5)	1 (0.5)
Cashew	190 (95.0)	10 (5.0)	0 (0)

Table 4: Health Status of Respondents

Variable	Frequency	Percentage (%)
Health perception		
Excellent	33	16.5
Very good	45	22.5
Good	75	37.5
Fair	42	21.0
Poor	5	2.5
Total	200	100.0
Do you take alcohol or hard drug when sad		
Yes	48	24.0
No	152	76.0
Total	200	100.0
Do you suffer from any illness/disease/health problem		
Yes	57	28.5
No	143	71.5
Total	200	100.0
Have you visited Prison health centre in past 4 weeks		
Yes	60	30.0
No	140	70.0
Total	200	100.0
Specify reason for the medical visit		
Body pain	2	1.0
Body pain/malaria	2	1.0
Hypertension	8	4.0
Headache	2	1.0
Headache/body pain	1	0.5
Chest pain	1	0.5
Hypertension/ulcer	1	0.5
Loss of appetite	1	0.5
Malaria	24	12.0
Skin disease	3	1.5
Stomach upset	1	0.5
Typhoid	1	0.5
Ulcer/cough	2	1.0
Cough/malaria	1	0.5
Diarrhea	3	1.5
Eye problem	1	0.5
Diabetes	3	1.5
Stomach upset/skin disease	1	0.5
Arthritis/skin infection	1	0.5
Asthma	1	0.5
None	140	70.0
Total	200	100.0
Do you experience any symptoms		
Yes	76	38.0
No	124	62.0
Total	200	100.0
Specify symptoms		
Body pain	10	5.0
Body pain/malaria	2	1.0
Body pain/headache	6	3.0
Chest pain	1	0.5
Dizziness	2	1.0
Headache	20	10.0
Joint pain	3	1.5
Loss of appetite	4	2.0
Malaria	1	0.5
Stomach upset	5	2.5
Cough/body pain	1	0.5

Table 4: Continued

Variable	Frequency	Percentage (%)
Fatigue	1	0.5
Diarrhea	4	2.0
Body ache	3	1.5
Fatigue /headache	3	1.5
Fatigue/excess urination	1	0.5
Fatigue/diarrhea/fever	1	0.5
Chest pain/body pain	1	0.5
Fatigue/shortness of breath	1	0.5
Headache/high body temp	2	1.0
Stomach upset/body pain	2	1.0
None	124	62.0
Total	200	100.0

Table 5: Body Mass Index Classification of Respondents

Bmi Classification	Frequency	Percentage (%)
Underweight (< 18.5 kg/m <sup>2</sup> )	43	21.0
Normal (18.5-24.9 kg/m <sup>2</sup> )	135	67.0
Overweight (25.0-29.9 kg/m <sup>2</sup> )	21	11.0
Obese I (30.0-34.9 kg/m <sup>2</sup> )	1	1.0
Total	200	100.0

Table 4 shows Health Status of the respondents. Approximately 38% of the respondents perceived their health as good. Likewise, 71.5% of them did not suffer any illness and 70% had not visited the prison health centre in the past four weeks as at the time of the study. These results corroborated the findings made by Constantinos *et al.* [22] who reported that half of the inmates (51%) did not report a health related condition. However, these findings are in contrast with the result by Mary *et al.* [23] where health status deterioration and poor mental health were reported by more than half of the respondents. According to American Thoracic Society [24] health perceptions (Or perceived health status) are subjective ratings by the affected individual of his or her health status. Some people perceive themselves as healthy despite suffering from one or more chronic diseases, while others perceive themselves as ill when no objective evidence of disease can be found. The result of this study revealed that 12% of the respondents had malaria, 3% had skin disease, 5% had ulcer and 4.5% had diarrheal disease. These results corroborated findings by Musa [3] who discovered that 18% of the inmates had intestinal parasites, 8% had diarrheal diseases, however in negation with the percentage of the inmates that had skin infections as almost half of the respondents (49%) had skin infections. According to CDC [25] lack of natural light and fresh air are characteristic features of many prisons worldwide. Many of these factors increase the chances of someone being infected with both communicable and non-communicable diseases [26].

Table 6: Relationship between the nutritional status and health status of the Respondents

Variable	Underweight	Normal	Overweight	Obese I	R <sup>2</sup>	p-value
Health perception						
Excellent	3.0%	11.5%	1.5%	0.5%		
Very good	1.5%	17.0%	4.0%	0.0%		
Good	7.5%	25.5%	4.5%	0.0%		
Fair	8.5%	12.0%	0.5%	0.0%	0.057	0.001
Poor	1.0%	1.5%	0.0%	0.0%		
Do you suffer from any illness?						
Yes	9.5%	18.0%	1.0%	0.0%		
No	12.2%	49.5%	9.5%	0.5%	0.047	0.002
How often have you taken alcohol or hard drugs in the past four weeks?						
Most of the time	0.0%	3.0%	0.0%	0.0%		
Some of the time	4.0%	9.0%	1.0%	0.0%		
A little of the time	4.0%	8.0%	1.0%	0.0%	0.007	0.224
None of the time	13.5%	47.5%	8.5%	0.5%		

Findings from this study also revealed that two-third of the respondents (67%) had BMI within the normal range, 21% were underweight, 11% were overweight, while 1% of the inmates were obese. These results are in negation with findings by Lines [27] who observed that, almost half of inmates in his study were obese and overweight. According to [12] having a BMI value within the normal range does not necessarily indicate that an individual is having a good nutritional status. The reason being that there are pit falls of using BMI as an assessment tool since it does not involve ethnicity-based cut-off tailored for specific population [28]. Both overweight and underweight are prevalent in prisons with the former being more prevalent and they have both been associated with several types of diseases [3].

This study also revealed that there was a significant relationship between BMI and Health Perception ( $p = 0.001$ ,  $R^2 = 0.057$ ), Body Mass Index and Occurrence of Illness ( $p = 0.002$ ,  $R^2 = 0.047$ ) of the respondents. This implies that the health status of the respondents was influenced by their Body Mass Index.

### CONCLUSION

This study revealed majority of the respondents (90%) were male and about 70% of the respondents were young adult. Larger percentage of the respondents (39%) had secondary education. The consumption of food groups such as fruits, vegetables, meat and poultry, fish and sea foods and diary of the respondents were generally low, while that of legumes and cereals were somewhat higher. The respondents did not meet up with their daily caloric intake and some essential micronutrients

when the mean nutrient intake was compared with the Recommended Dietary Allowance. However, respondents had a high percentage fulfilment for their daily carbohydrate. The study further shows that majority of the respondents derived their carbohydrates from cereals. The nutritional status of the respondents was generally good, few of the respondents were underweight or overweight and few of the respondents perceived their health as good.

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