



Assessment of Food and Nutrient Provision within Prisons in the Ashanti Region of Ghana

Nana Ama Frimpomaa Agyapong^{1*}, Reginald Adjetey Annan¹
and Charles Apprey¹

¹Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Ghana.

Authors' contributions

This work was carried out in collaboration between all authors. Author NAFA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors RAA and CA managed the analyses of the study. Author NAFA managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Objective: Food provision within the institutional environment is important and goes beyond satisfying the physiological need for food to other matters such as overall health and wellbeing which are of core importance to individuals. There is a paucity of data as regards food and nutrient provision within Ghanaian prisons. This study assessed nutrient provision from a static menu within three adult prisons in the Ashanti Region of Ghana.

Design: The Household record was used to determine the quantity of ingredients provided for each food item on the menu and the West African food composition table was used to analyse nutrients from raw ingredients weighed.

Settings: This study was conducted within three prisons, one female prison and two male prisons.

Results: The overall mean daily caloric provision for the three prisons was 2114.1±329.3 kcal/d.

*Corresponding author: E-mail: nagyapong29@gmail.com;

Protein 38.23 g/d for males, 418.4 g/d for females, fibre 24.8 g/d for males, 42.4 g/d for females, vitamin A 88.25 µg/d for males, 3087.2 µg/d for females, vitamin E 4.65 mg/d for males, 18.5 mg/d for females, vitamin C 19.95 mg/d for males, 96.4 mg/d for females, vitamin B₁₂ 0.95 µg/d for males, 2.8 µg/d for females and folate 234.4 µg/d for males, 868.3 µg/d for females provided were inadequate for male inmates but in excess for females.

Conclusion: Nutrients provided by the prison food was outside the recommended quantities being mostly excessive for females and inadequate for males. Interventions of appropriate nutritional provision should commence in Ghanaian prisons as inadequate or excess nutrient provision poses a health risk to inmates.

Keywords: Nutrition; food; prison; inmates; nutrients.

1. INTRODUCTION

The Ghana Prisons Service as at the year 2015 had an average of 19, 599 prisoners most of whom fell within the age range of 18-35 years. Out of this number, only 330 representing 1.7% were females [1]. Overcrowding and poor food provision are typical of prisons and worst in African prisons [2]. In the year 2016, mass attempt to break jail occurred at the Kumasi central prisons, located in the Ashanti region of Ghana and inmates reported their action to be due mainly to inappropriate food provided to them [3].

Providing optimal food within the prison environment should be paramount because it is an environment where inmates solely depend on the prison food to meet nutritional needs and food from outside may be seldom or completely not allowed. Additionally, compared to other institutions, inmates are exposed to the food for a relatively long period of time [4].

The feeding rate for a prisoner per day in Ghana is 1.80 cedis or 0.4 dollars an amount which is inadequate to provide optimal nutrition to inmates [5]. Adequate nutrient provision plays an integral role in ensuring health and food is a basic human need. Inappropriate diet contributes to both chronic and deficiency diseases [6,7]. Optimal nutrition also plays an integral role in the reformation process as certain nutrients are implicated in responsible behaviour [8]. Vitamin and mineral supplementation have been found to reduce aggressive behaviour but hypoglycaemia is strongly linked to aggressive episodes [9]. Food is a basic human need and a determinant of behaviour. Prisoners like other individuals satisfy their basic need for food before paying attention to other activities that take place within the prison setting [10]. Rehabilitation programmes will therefore go down the drain if

they take place within an environment of nutrient and food scarcity [11].

Studies have been conducted in other countries to assess the quality and nutritional value of prison foods but no such data exist in Ghana. There have been several reports on the poor quality of foods provided in Ghanaian prisons, but this is the first study that has assessed the prison menu and nutrients provided to inmates [5,12].

2. METHODS

2.1 Data Collection

A personal visit was paid to three prisons, two male prisons and one female prison in the Ashanti Region of Ghana to obtain their menu. The prisons operate on a static menu that has most of the food items repeated for most of the week days. The menu is not altered unless during special occasions or when the prisons receive donations. The female prison provided three separate meals per day but lunch and supper were provided together for males. Menu obtained was for three days but captured all the probable foods to be provided for the other days because of the repetition of foods. The menu was made up of the foods to be served for the days of the week but did not have the portions each inmate was expected to get. Ingredients for each menu item were weighed and collected at the prisons store. The quantity of ingredients to be given depended on the number of inmates and the cost of the food rather than on portion per inmate.

2.2 Household Record

A three day household record was used to obtain information on usual dietary provision to inmates within the three prisons. This was used to

ascertain if usual nutrient provision met the Recommended Daily Allowances (RDAs) of inmates. It involved weighing for the three days; two weekdays and one weekend, all the ingredients that were to be used for cooking. Household record was done for three days because the menu was repeated for most days of the week and was static. Food provision to inmates was estimated by dividing the weights of the ingredients by the number of prisoners to be served. The average number of inmates for the three days for each prison was 1639 for male prison 1, 242 for male prison 2 and 40 for the female prison.

There were no prison stores within the three prisons visited where inmates may buy additional foods, food may, however, be brought in by friends and families but this is allowed only once a month for convicts and biweekly for remand prisoners.

2.3 Data Analysis

Ingredients weighed were divided by the number of inmates to be served. The West African Food Composition Table [13] was used to estimate nutrients provided from raw ingredients weighed. SPSS version 20 was used to find the overall mean and standard deviations of nutrients provided.

2.4 Ethical Consideration

Ethical approval for the study was sought and granted by the Committee on Human Research Publication and Ethics (CHRPE), School of Medical Sciences, KNUST, Kumasi; ref CHRPE/AP/407/16. In addition to this, permission was sought and granted by the Ghana Prisons Service headquarters before data collection at the various prisons.

3. RESULTS

The menu obtained was basically made up of corn foods like corn porridge and banku. Banku was served with palmtree soup or groundnut soup and had no meat. However, beans powder and small sized herrings were added to soup during preparation. Inmates prepared the food supervised by a kitchen officer. Females mostly had beans stew as part of lunch or supper. Table 1 shows a three day menu obtained from the three different prisons.

4. DISCUSSION

This study assessed the prison menu of three prisons in the Ashanti region of Ghana, two male prisons and one female prison. Little diversity was seen in the foods provided and the menu almost completely lacked vegetables. Only vegetables like onion and pepper were used as these form the basis for the preparation of soups or stews. Meat was completely missing in the menu and inmates had access to very little fish. The menu was repetitive with most of the foods being repeated even within the three days and also for the rest of the days of the week.

Female inmates had most nutrients in excess while male had them inadequately. All the prisons have the same feeding rate but the store keeper at the female prison said they receive a lot of donations and that accounts for the higher nutritional provision. Female inmates enjoyed a higher quantity of fish and beans were a major part of their menu making their diet better than that of males. Male inmates also receive some form of donations but these were few compared to what is received by the female prison and their large number makes the contribution of these donations to the diet almost insignificant.

Calories provided were in excess for all prisons. Prisoners are mostly sedentary and provision of higher calories puts them at risk of obesity and its attendant problems [14, 15]. Cardiovascular diseases prevalence is high among Ghanaian inmates and is the second leading cause of death within this population [16]. This can be attributed to the type of food provided. The menu is deficient of fruits and vegetables and contains a lot of oil. Nutrients were generated from raw ingredients that were weighed and cooking reduces the quantity of nutrients especially vitamins. However, even in their raw state, most vitamins were significantly lower for male inmates. This puts them at risk of deficiency as well as chronic diseases. The outbreak of deficiency diseases like beriberi have occurred in some African prisons [17]. Anaemia is a leading cause of death in Ghanaian prisons. The menu is deficient of first class protein and fruits rich in vitamin C that supports the absorption of non heme iron is missing in the menu [18].

Studies done in other countries have found macro nutrients to be between the ranges of the AMDR. In this study however, macro and most micro nutrients were outside suggested ranges [2,19].

Table 1. A three day menu obtained from the three different prisons

Days	Breakfast			Lunch			Supper		
	Male prison 1	Male prison 2	Female prison	Male prison 1	Male prison 2	Female prison	Male prison 1	Male prison 2	Female prison
Day 1	Corn porridge	Corn porridge	Tom brown, sugar, bread	Banku with palmnut soup	Banku with palmnut soup	Beans stew with Gari	Banku with palmnut soup	Banku with palmnut soup	Rice with beans stew
Day 2	Corn porridge	Corn porridge	Corn porridge, sugar, bread	Banku with palmnut soup	Rice with groundnut soup	Banku with groundnut soup	Banku with palmnut soup	Rice with groundnut soup	Banku with groundnut soup
Day 3	Corn porridge	Corn porridge	Corn porridge, sugar, bread	Boiled rice with palmnut soup	Banku with groundnut soup	Beans stew with gari	Boiled rice with palmnut soup	Banku with groundnut soup	Beans stew with boiled rice

Table 2. Average daily nutrient provisions within the prisons

Nutrients	RDA/AI/AMDR for females	RDA/AI/AMDR for males	Nutrient provision by the prisons			Mean	Standard deviation
			Male prison 1	Male prison 2	Female prison		
Energy (kcal/d)	1800	2200	2021.7**	2083.1**	3383**	2114.1	329.3
Protein (g/d)	46	56	34.3*	42.2*	418.4**	59.2	93.1
Carbohydrate (g/d)	130	130	373.3	354.6	531.5	381.0	39.5
Fat (g/d)	-	-	59.1	64.0	236.9	70.8	43.1
Fibre (g/d)	25	38	28.0*	21.6*	42.4**	28.1	4.2
Calcium (mg/d)	1000-1300 mg	1000-1300 mg	55.0*	155.8*	333.9*	84.5	72.3
Iron (mg/d)	15-18	8-11	13.6	13.2	23.6	14.2	2.4
Magnesium	310-360	410-420	359.0*	398.8*	734.2**	387.2	90.8
Phosphorus mg/d	700-1250	700-1250	1071.3	864.9	1797.2**	1092.2	194.4
Potassium mg/d	4700	4700	1232.2*	1856.0*	3576.0*	1452.8	587.7
Sodium mg/d	1500	1500	1031.1	3939.4	3415.6	1496.0	996.9
Zinc (mg/d)	8	11	7.2*	8.2*	16.8**	7.9	2.3
Copper µg/d	900	900	1000**	1200**	2700**	1.1	0.41
Vitamin A µg/d	700	900	10.4*	166.1*	3087.2**	221.6	744
Vitamin E mg/d	15	15	1.4*	7.9*	18.5**	3.2	4.5
Thiamin mg/d	1.1	1.2	1.1*	1.5	2.6**	1.2	0.4
Riboflavin mg	1.1	1.3	0.5*	1.0*	3.0**	0.7	0.6
Niacin mg/d	14	16	7.5*	22.3**	36.4**	11.1	8.1
Vitamin B6 (mg/d)	1.3	1.3	1.4	2.0**	2.9**	1.6	0.4
Folate µg/d	400	400	136.6*	332.0*	868.3**	205.5	182.9
Vitamin C mg/d	65-75	75-90	15.1*	24.8*	96.4*	28.1	18.0
Vitamin B12 µg/d	2.4	2.4	0.1*	1.8*	2.8**	0.5	0.8
Percentage carbohydrate (%)	45-65	45-65	73.8**	68**	35.8*	70.3	11.1
Percentage fat (%)	10-35	10-35	26.3	27.7	35.9**	27.1	2.3
Percentage protein (%)	20-35	20-35	6.8*	8.1*	28.2	8.3	5.2

The overall mean denotes the mean for the three prisons. *denotes inadequate provision and ** denotes excess provision. RDA of nutrients was based on the age range 18-50 year

Household record was used because this is the first study in Ghana on nutrient provision within prisons and it sought to find out the food security of the prison as a "household" suppose foods that are cooked are shared equally among inmates. From the results, prisons in Ghana are faced with nutrient scarcity and stakeholders should take a look at prison nutrient provision and improve it.

Ghana is a country where a lot of fresh produce waste occur and prison authorities can liaise with local farmers to acquire these produce at a cheap price [20]. Prison farms should be expanded and fruits and vegetables should be grown and form part of the prison meal provision.

Further studies should look at individual food consumption to give a detailed description of nutrient provision.

5. LIMITATIONS

The study assessed nutrient provision using raw ingredients and it is more likely that actual nutrients provided may be lesser than reported in this study. Also, waste was not estimated from ingredients weighed and this presents as a limitation to the study.

6. CONCLUSION

Good nutrition is essential for good health. The findings of this study suggest that food provided for inmates is inappropriate being either inadequate or excessive. Provision of nutrients within suggested ranges guards against both chronic and deficiency diseases. High prevalence of diseases among prisoners adds to their basic care which is a burden to governments especially in developing countries like Ghana. No diversification was seen in the menu with most food repeated throughout the week. The menu completely lacked fruits and provided minimal amount of vegetables as well as animal protein. Providing optimal nutrition should be a priority in the prison system. This includes diversification of the menu, increasing the quantity of animal protein and addition of fruits and vegetables.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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