

## Comparative Analysis of Ingredients, Nutrients Composition and Consumption Pattern of Commonly Consumed Bouillon Cubes in Mubi North Local Government Area, Adamawa State, Nigeria

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### Abstract

Sixteen brands of NAFDAC approved bouillon cubes obtained at Mubi Market were used for this study, to compare the ingredients, nutrients composition and consumption pattern of the bouillon cube in Mubi North Local Government Area, Adamawa State. About 370 respondents were randomly selected from eleven wards to identify the consumption pattern using and pretested questionnaires. Data generated were analyzed using simple percentages. Results showed that the types of bouillon cubes sampled contained Monosodium glutamate, starch, fat and salt except Ajino moto pellets contained only Monosodium glutamate. Nutrient showed energy content ranging from 152 to 808 kcal protein 4.4 to 11.7g, total fat 1.4 to 9.42g, while carbohydrate 16 to 23g per 100g. Also, minerals - sodium, iodine and iron showed contents of 21 to 24g, 2 to 4.33mg and 0.12 to 79 mg per 100g respectively. This study revealed that Maggi star was most frequently used having 33.5% while, 58% of the respondents do not know the content of the bouillon cubes and 68% used because of taste. An average pot of jollof rice, stew, soup and yam pottage 42%; 40.9%; 41.8% and 41.8% respectively, of the respondents used 5 to 8 cubes. About 47.3% of the respondents used 13 cubes per week. Bouillon cubes consumed in this area contains high amount of ingredients and nutrients that have negative effect yet they are consumed in excess with Maggi star being the best.

**Keywords:** Bouillon Cubes, Consumption, Ingredient Composition, Nutrient Content, Health.

### Introduction

Bouillon cubes are taste enhancers added to foods to improve their palatability. A bouillon cube is a dehydrated stock formed into small cube of about 15mm wide or dried granules. The hydrated stock of meat as bouillon cubes in form of tablet was known in 17<sup>th</sup> century to English food writer, Anne Blencowe (NAS 1979, Al-Subhi, 2013). Others who tried to patent bouillon cubes and tablets were turned down for lack of originality (Al-Subhi, 2013). Bouillon cube is typically made by dehydrating fish or meat stock mixed with a small portion of fat, salt and seasoning shaping them into a small cube. It is also available in a granular form, when placed inside water, such as soup pot the cubes dissolves and its flavours are released (Ault, 2004; Blair, 2012). However Commercial bouillon cubes are composed of ingredients such as salt, sugar, flavour enhancers such as monosodium glutamate (Lillian et al., 2013). Herbs, spices of vegetables, are mixed in industry with powder like fat and oil, with or

without meat stock to form cubes shape (Misner, 2000; Mejia et al. 2015). Use of bouillon cubes as a flavor enhancer is wide spread across Africa and Nigeria, used in many different African recipes and most often not used for nutritive value (Mejia et al., 2015).

Bouillon cubes have been reported to be very high in sodium from salt (NaCl) which result in many negative health issues (Emurotu, et al., 2017). It is widely known that excess salt in diet can lead to high blood pressure leading to high risk of cardiovascular disease and stroke. Incidentally the primary ingredient in bouillon cubes is salt (NaCl) which causes more sodium in the blood, leading to high blood pressure and also contributes to the buildup of plaque on the arteries a greater risk of stroke and heart diseases (SCFSPDPNA, 2006). There are many varieties of bouillon cubes in Nigeria and people consume them almost every day regardless of the health implications. However, people may not be aware of the health implications of excess consumption of bouillon cubes. Bouillon cubes enhancer is wide spread across Africa, despite the fact that it has been accused of being high in sodium and linked to high cases of heart failure and kidney disease and other non-communicable diseases (NCD). They are also made up of hydrogenated oil, as such excess consumption of the bouillon cubes could lead to obesity and cancer among other health problems (Caponio *et al.*, 2002). Hydrogenated oils are once healthy oils processed into unhealthy Trans fatty acids which have been shown to increase bad cholesterol and decrease good cholesterol (Hearty, 2010; Caponio *et al.*, 2002). Trans-fat consumption has definite link to increase the chance of developing coronary artery disease which is a hardening and narrowing of arteries that supply blood to the heart laying the stage for stroke, heart failure and kidney diseases (Misner, 2000; SCFSPDPNA, 2006).

Another major ingredient in bouillon cubes is Monosodium glutamate (MSG), the sodium salt of glutamic acid, one of the most abundant naturally occurring non-essential amino acids. It is used in the food industry as a flavour enhancer with a umami taste (Misner, 2000). MSG has been reported to present symptoms such as headache, numbness, linging flushing muscle, highness and generalized weakness, Asthma, Obesity, and Cancer when consumed in excess, this occurs due to cholesterol in the blood stream (Eweka, 2010; Wijayasekara & Wansapala, 2017). Extensive research has been done on MSG without conclusion across the globe whether monosodium glutamate is safer for consumption (Eweka, 2010; Bera et al., 2017; Wijayasekara & Wansapala, 2017). Bouillon cubes are staple part of many lower income consumer's diets in Nigeria, so readily available and used every day in every house hold, being used even in the remotest part of the country with over 60 million cubes consumed daily (Akpanyung, 2005; Elemo and., 2008). In Nigeria, some people will not eat a dish if the taste of bouillon cubes is missing in it. Nigerians consume so much stock cubes that they often referred to it as "Nigerian Seasoning cube". Forgetting that they are actually an import to Nigeria. They are added so much to every single dish so much that we seem to have forgotten the natural tastes of our wonderful range of food. (DeWitt, 2000). In Nigeria, bouillon cubes come in different varieties and brand with different ingredients depending on whether they contain real chicken, beef, fish, cray fish, or vegetable extract.

Depending on the brand, artificial flavour of meat, fish or chicken may also be added to “trick” consumers into thinking they are buying the real stock cubes (DeWitt, 2000; Sherman, 2013). Apart from being the stable ingredient for enhancing flavour in food it is also used as a vehicle for fortification to overcome micronutrient deficiency in Sub-Saharan African countries including Nigeria, Considering the fact that Bouillon cubes are high not only in sodium but also hydrogenated oils and monosodium glutamate (MSG) coupled with all the negative implications of the ingredients content of bouillon cubes, however, not much work has been done regarding the Comparative Evaluation of Ingredients, Nutrients Composition and consumption pattern of commonly consumed bouillon cubes in Mubi North Local Government Area, Adamawa State, Nigeria.

### **Aim and Objectives**

- To evaluate and compare the nutrient and consumption pattern of commonly bouillon cubes in Mubi North metropolitan.
- To advice the consumers of bouillon cubes on the risk of consuming excess bouillon cubes.

### **Materials and Methods**

#### **Materials**

All the materials used were obtained from Mubi Main Market, in Adamawa state Nigeria. Sixteen brands of bouillon cubes were found and purchased namely, Mr. Cheff, Knorr Cube, Onga, Ami for Life, Testy Cubes, Dangote, Ajino Moto Royco, Knorr Chicken Maggi Star, Ric – Giko Chicken Cubes, Gino Max Beef flavour, Gino Max Beef flavour, Dan 2 seasoning chicken flavour, Terra, Mum’s Pride, Devou Kings.

#### **Methods**

Only bouillon cubes having NAFDAC certification number were marked for this research, The ingredient compositions of these bouillon cubes were identified from the nutritional information on the labels of the sachets and packages of the bouillon cubes. Structured questionnaires were used to source information about the consumption pattern from respondents randomly selected from all the wards in Mubi North Local Government area of Adamawa State, Nigeria.

#### **The Study Area**

The research work was carried out in Mubi Metropolitan. The estimated population of Mubi North LGA is put at 188,301 inhabitants with the area mostly populated by members of the Gude, Nzanyi, Fali, Margi and Higgi, Fulani and Hausa, mostly farmers, fishing, cattle rearing and trading (Amina *et al*, 2023, Adebayo & Tukur, 1991). There are Eleven (11) wards in Mubi North local government area.

### Number of Respondents

Using random sampling method, thirty-six (36) respondents each from ten (10) wards in Mubi North Local Government Area and Kolere Ward which is more densely populated thirty-nine respondents were chosen totaling 399. Therefore, 399 questionnaires were distributed to the chosen respondents. Out of the 399 questionnaires 370 was correctly filled, 10 were wrongly filled while 19 questionnaires were not retrieved from the respondents. The data analysis was therefore, based on the returned 370 questionnaires.

### Method of Data Collection

Primary and secondary data were used for the purpose of this research. The primary data was collected through interviews and discussions with dietitians and nutritionists in Department of Nutrition and Dietetics Federal Polytechnic Mubi who structured and tested the questionnaires.

### Data Analysis

The findings of this research as presented in tables were carried out using percentage:

$$\frac{\text{NUMBER OF RESPONDENTS}}{\text{TOTAL RESPONDENTS}} \times 100$$

### Validity and Reliability of the Instrument

Method of validity employed was face validity. The questionnaire was presented to two (2) experts Nutritionist and Food Scientist for content validation. Kuder-Richardson formula 20 to establish the internal consistency reliability of the instrument as adopted by (Hair,Black,Babin and Anderson 2010). was used.

### Results

**Table 1:** Bouillon Cubes found in Mubi market, producers and NAFDAC NO (Field Work)

Type of Bouillon Cubes	Price/packet N	Producers	NAFDAC No:
Terra	650	West African cubes ltd	No.01-0721
Royco	600	Unilever plc	.01 -0647
Knorr seasoning	800	Unilever plc	01.0631
Maggi star	650	Nestle plc	01.4303
Moms pride	600	Sweet nutrition	- 08830
Devon kings	1500	Embele W.Africa	08.2360
Ami for Life	450	Sweet nutrition	A1.6423
Ric-Giko chicken cubes	480	Erisco food ltd	-08- 0874
Tasty cubes	450	Nascon plc Ota Ogun	A81158
Gino max beef flavor	350	Sweet Nutrition	08.8831
Dangote seasoning	700	Nascon plc Ota	A81158
Dan-Q seasoning chick	600	Nascon plc Ota	08.0809
Ajino moto	100	Nestle plc	010298
Knorr chicken	900	Unilever plc	01.0485
Onga	350	Promasidor Ltd	B1-91766
Mr chef	700	Brookside Ltd	A1.6594

Table 2 shows the ingredients composition of the bouillon cubes. All types of bouillon cubes sampled (100%) contained Mono-sodium glutamate, starch and salt except ajino moto pellets (6.25%) that contained no salt and starch, 68.7% contained vegetable fat while 25% contained palm oil. Those with Vegetable contents (onion, garlic, turmeric) were 62.5%, 12.5%, 37.5% respectively; 43.75% contained iron pyrophosphate, only 12.5 % (2 samples) of them contained maltodextrin. 88% of the samples contained sugar while 56 % had caramel; 87.5 % of the samples added other flavour enhancers such as beef, chicken and spices.

**Table 2:** Ingredients content of bouillon cubes

Types of bouillon cubes	INGREDIENTS													
	Mono sodium glutamate	Vegetable fat	Onions	Garlic	Turmeric	Iodized salt	Starch	Flavor	Enhancer	Palm oil	Sugar	Caramel	Maltodextrin	Iron
Maggi star	P	NP	P	NP	NP	P	P	P	P	P	P	P	NP	P
Devon kings	P	P	P	NP	NP	P	P	P	P	NP	P	P	P	P
Knorr seasonin	P	P	P	NP	P	P	P	P	NP	NP	P	P	NP	P
Ami for life	P	P	NP	NP	NP	P	P	P	P	P	P	P	NP	P
Knorr chicken	P	P	P	P	NP	P	N	P	P	NP	P	P	NP	P
Gino max	P	NP	P	NP	P	P	P	P	P	P	P	NP	NP	NP
Onga	P	p	NP	P	NP	P	P	P	P	NP	P	NP	NP	NP
Terra	P	P	NP	NP	N	P	P	P	P	NP	P	NP	NP	P
Royco	P	P	P	P	NP	P	P	P	P	NP	P	N	NP	NP
Mr. Cheff	P	P	p	NP	NP	P	P	P	P	NP	P	N	NP	P
Tasty cubes	P	NP	NP	NP	NP	P	P	NP	NP	NP	NP	NP	NP	NP
Dangote	P	P	NP	NP	NP	P	P	P	P	NP	P	P	P	NP
Dan 2	P	NP	NP	NP	NP	P	P	P	NP	P	P	P	NP	NP
Ric- giko	P	N	p	NP	P	P	P	P	P	NP	P	NP	NP	NP
Ajino moto	P	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
Mom'sp ride	P	P	P	NP	P	P	P	P	P	NP	P	NP	NP	NP

P - Present, Np - Not present

Table 3 shows the nutrient composition of the samples. The energy content of the samples ranged from 152 – 808.43kcal/100g; protein content ranged from 4.4 - 11.7g/100g , the total fat content ranged 1.4 - 9.42g / 100g of each sample while the carbohydrate ranged from 16g- 23g/100g, of which sugars ranges from 5.6 – 15.2 g /100g and dietary fibre from

0.03 – 1g/100g. The minerals, sodium, iodine and iron had contents of (21 – 24g / 100g, 2 – 4.33mg/100g and 0.12 – 79 mg /100g) respectively.

**Table 3:** Nutrient contents of the bouillon cubes as collected

	ENERGY/ 100g (Kj/kcal)	PRO/ 100g (g)	CHO / 100g (g)	100g of Which sugar (g)	Sodium /100g (g)	Iodine/ 100g (mg)	Dietary fibre 100g	Iron/ 100g (mg)	Total fat/100g (g)
Maggi star	681.161	5.6	26.4	13.3	24.3	3	0.3	63	1.4
Devon	659.4	6.73	21.15	-	20.89	2.00	-	-	5.12
kings									
Knorr	623	11.7	25	13.7	22	36.39	<1	76	5.2
chicken									
AMI for	152	6	16	-	23	-	1	-	7
life									
Knorr	635	10.1	26	15.2	22	3639	<1	75	5.6
seasoning									
Mom's	808.34	3.99	23.82	-	-	4.33	-	31.34	9.42
pride									
Tasty	-	-	-	-	-	-	-	-	-
cubes									
Mr chef	764.41	5.50	23.45	-	-	4.25	-	-	7.76
Royco	566	4.4	27	12.8	24	4058.8	0.4	75.0	5.5
Dangote	-	-	-	-	-	-	-	-	-
Dan 2	-	-	-	-	-	-	-	-	-
seasoning									
Terra	659.01	6.00	18.00	6.15	23174.4	3475.50	0.03	0.12	6.00
Onga	-	-	-	-	-	-	-	-	-
Ric-gicko	-	-	-	-	-	-	-	-	-
Gino max	797.190	10.4	18.5	5.6	21.8	-	-	-	8.3
Aji-no	-	-	-	-	-	-	-	-	-
moto									

The results of study revealed that, the consumption pattern of the bouillon cubes in Mubi north LGA of Adamawa state; Table 4 shows the demographic information of the respondents with 71.8% of the sample population being female, showing that majority of the respondents were female. 20.9% was from age range of ≤ 20 years. 65.5% respondents from age range of 21-50 years while 13.6% respondents within the age range of 51 and above years, indicating that majority of the respondents were adults. 13.7% of the sample population were farmers, 27.3% were civil servant, 14. 5% of the sample population were retired civil servants. 21.8% were students, 22.7% were traders. 31.8% of the sample population have informal education background, 26.4% of the sample population has basic education while 41.8% has tertiary education qualification. About marital status 42.7% of the sample population were married, 21.8% were single. 22.7% were divorced, 7.3% are widows 5.5% were widowers. This indicated that majority of the sample population were married.

**Table 4:** Demographic information of the respondents

Variables	Number of respondents	Percentages (%)
<b>Sex</b>		
Male	104	28.2
Female	266	71.8
Total	370	100
<b>Age</b>		
< = 20 years	77	20.9
21-50 years	242	65.5
51 and above	51	13.6
Total	370	100
<b>Occupation of respondents</b>		
Farmer	50	13.7
Civil servant	101	27.3
Retired	54	14.5
Student	81	21.8
Business	84	22.7
Total	370	100
<b>Educational qualification</b>		
Informal education	118	31.8
Basic Education	95	26.4
Tertiary Education and above	157	41.8
Total	370	100
<b>Marital status</b>		
Married	158	42.7
Single	81	21.8
Divorce	84	22.7
Widow	27	7.3
Widower	20	5.5
Total	370	100%

Field study, 2022

Table 5 showed the response to the questions on the type of bouillon cubes used by the respondents. All the bouillon cubes were used by respondents, with maggi star having the highest number of users 124/370 (33.6 %) of the sample population while knorr chicken, Ajino moto, and Dangote Q, had least usage of 6 / 370 (1.8 %) of the respondents while others had from 2.7 – 9.1% users.

**Table 5:** Type of Bouillon Cubes often used by respondents

Type of bouillon cubes	Frequency	Percentage (%)
Mr. Chef	17	4.6
Royco	20	5.4
Terra	6	1.6
Knorr	27	7.3
Knorr Chicken	6	1.6
Mum's pride	23	6.2
Onga	34	9.2
Maggi star	124	33.5
Devon kings	27	7.3
Ami for Life	23	6.2
Ric-Giko chicken cubes	10	2.5
Tasty cubes	10	2.7
Gino Max Beef flavor	6	1.5
Dangote	25	6.8
Dan-2 seasoning chicken flavor	6	1.6
Ajino moto	6	1.6
Total	370	100

**Source:** Interview Demographic

Table 6 shows the response to knowledge of the ingredient composition of the bouillon cubes and reasons for using bouillon cubes. 58.2 % of respondents had no knowledge of the ingredients composition of the bouillon cubes. On the reason for the use of the bouillon cubes 58.4% (216/370) of the sample population use bouillon cube because of its taste, 20.9% because of flavour, and 10% use it because of its nutrient content while 10% use it because of its color. This implies that majority of the respondents use bouillon cube because of its taste.

**Table 6:** knowledge of the ingredient composition and reasons for use of bouillon cubes.

Variables	Number of respondent	Percentage
Yes	155	41.8
No	215	58.2
Total	370	100



Reasons for using bouillon cube		
Taste	216	58.4
Flavour	78	20.9
Nutrient content	34	10
Taste	216	58.4
Flavour	78	20.9
Nutrient Content	34	10
Colour	34	10
Total	370	100

Table 7 shows the quantity of bouillon cubes used in cooking 4 liter pot of jollof rice, stew, soup and yam pottage. 36.5% of respondents use less than or 4 bouillon cubes, 42.7% use 5 to 8 cubes, 14.6% use 9-12 cubes, while 6.2% use 13 and more cube for cooking jollof rice. For cooking stew, 34.6% use 4 or less cubes, 40.9% use 5 to 8 cubes, 20.8% use 9 – 12 cubes while 3.8% use 13 cubes and more. On cooking of soup 9.1% of respondents use 4 or less cubes, 43.6% use 5 to 8 cubes, 11.8% use 9-12 cubes while 5.5% use 13 cubes and more. For 4 liter of Yam pottage, 130 respondents (35.1%) use 4 or less cubes 170 (45.9%) use 5 to 8 cubes, 16.7% use 9 - 12 cubes while 8 respondents (2.1%) use 13 cubes and more.

**Table 7:** Quality of bouillon cubes used in cooking 4 cups, 4 liters pot of jollof rice

Variables	Number of respondent	Percentage
<= 4 cubes	135	36.5
5 to 8 cubes	158	42.7
9 to 12 cubes	54	14.6
13 cubes and above	23	6.2
Total	370	100
<= 4 cubes	128	34.6
5 to 8 cubes	151	40.9
9 to 12 cubes	77	20.8
13 cubes and above	14	3.8
Total	370	100

**Table 8:** Quality of bouillon cubes used in cooking stew of about four litres/pot

Variable	Number of respondent	Percentage
<= 4 cubes	128	34.6
5 to 8 cubes	151	40.9
9 to 12 cubes	77	20.8
13 cubes and above	14	3.8
Total	370	100

**Table 9:** Quantity of bouillon cubes used in cooking soup of 4 liters/pot

Variables	Number of respondent	Percentage
<= 4 cubes	145	39.1
5 to 8 cubes	161	43.6
9 to 12 cubes	44	11.9
13 cubes and above	20	5.4
Total	370	100

**Table 10:** Quantity of bouillon cubes used in cooking yam pottage medium pot-4 liters.

Variables	Number of respondent	Percentage
<= 4 cubes	130	35.1
5 to 8 cubes	170	45.9
9 to 12 cubes	44	16.7
13 cubes and above	6	2.1
Total	370	100

Field study, 2022

Table 11 shows the approximate quantity of bouillon cubes consumed weekly by the respondents; 3.2% use 4 or less cubes to cook different things weekly. 10.3% use 5 to 8 cubes, 39.2% use 9 - 12 cubes while 47.3% use 13 cubes and more.

**Table 11:** weekly consumption of bouillon cubes by respondents

Variables	Number of respondent	Percentage
<= 4 cubes	12	3.2
5 to 8 cubes	38	10.3
9 to 12 cubes	145	39.2
13 cubes and above	175	47.3
Total	370	100

## Discussion

### Availability of Bouillon Cubes and Demographic Parameters

Varieties of bouillon are available and easily accessible in Mubi main market. People have a lot to choose from the available sixteen types of the bouillon cubes. The cost of the bouillon cubes were not very much wide apart. However the knorr types, of bouillon cubes even though they have better content of important mineral iron and other nutrients (Table 3) cost more and is among the least consumed as shown in Table 5. This suggests that people do not consider the nutrient content or nutritive value when purchasing the bouillon cubes for use. Demographic information (Table 4) shows that the respondents are all adults, from all works of life, educated and should know the importance of what to consume in the families, they are accountable for what they are eating. Akpanyung (2005) reported that Bouillon cubes are staple part of many family diets in Nigeria, so readily available and used

every day in every house hold, even in the remotest part of the country, with over 60 million cubes consumed daily.

### **Knowledge and Choice of Bouillon Cubes often used by Respondents**

Higher percentage of the respondents not knowing the ingredient composition of the bouillon cubes (58.2 %) (Table 6) calls for concern, because it will be difficult to convince an ignorant person that excess consumption of bouillon cube could lead to health hazards. This probably is the reason for the greater choice (33.5%) of Maggi star by the users not minding its higher content of salt and MSG (Table 5). Greater choice for Maggi star could also be attributed to the fact that Maggi star was the first brand of bouillon cube introduced in the country in 1966 and in 1971 due to its high demand, nestle established its packaging plant in Lagos so people are used to it.

### **Ingredient Composition, Nutrient Content, Quantity of Bouillon Cubes Used and Health**

All the sampled bouillon cubes (100%) having the implicated health hazard components - monosodium glutamate, salts, fats and other enhancers (Table 1) as their basic ingredients is a signal that long term excess consumption of these cubes will definitely lead to health issues. These ingredients has been reported to present symptoms such as headache, numbness, lunging flushing muscle, highness and generalized weakness when consumed in excess, laying the stage for heart diseases and stroke (Eweka, 2010), Extensive research has been done on MSG with no conclusion across the globe whether monosodium glutamate is safer for consumption.

However, because the taste tendency which these ingredients impart to foods one would suggest that alternative sources of the 'umami' taste be provided by food scientists. High intake of sodium in salts in bouillon cubes could contributes to health hazards such as hypertension and coronary health diseases leading to stroke (Hearty, 2010; Eweka, 2010,NAFDAC, 2022). Nevertheless, reducing the salt may affect consumer satisfaction because sensory loss may affect consumer liking due to taste if salt is reduced. Equally reducing salt may have other effects of reducing iodine from salt because salt is a major vehicle for iodine fortification and Bouillon cubes had been selected and ranked topmost among the potential food fortification vehicles for priority minerals iron, iodine zinc for Nigeria (NAFDAC, 2022). An option is to avoid excess and high frequency of consumption of bouillon cubes.

Some of the sampled bouillon cubes (38%) containing only flavour enhancers and salt (Table 3) is a strong signal of destructive effects of such brands on health of the consumers because such brands (Tasty cubes, DangoteQ, Onga, Ric-gicko Ajino moto) costs less and people ignorantly consume them in large amounts just for taste and not for nutritive value (Mejia *et al.* 2015). Such Bouillon cubes are staple part of many lower income consumer's diets in Nigeria as reported by (Akpanyung, 2005). Only 6 brands (38%) of the samples

containing iron, an important micro-nutrient shows that the producers are not helping in the fortification agenda using bouillon cubes as vehicles of fortification. The brands containing iron (Knorr, Maggi star, Moms pride terra) are not the highest consumed (Table 5) probably because people do not have knowledge and importance of the nutrient contents.

High number of the respondents indicated using large number of cubes in cooking various types of food (Table 7) shows that the recommended daily amount of Na (6 g salt /day ) by NAFDAC is greatly abused with the attendant health implications. RDA of Na by NAFDAC is 0.4mg/kg for seasonings in Nigeria (WHO 2012, WHO 2014). WHO recommends 5g of salt per day. Long time intake above these levels is associated with negative health consequences. Weekly consumption of 13 cubes and above by more than 47% (Table 8) of the respondents in Mubi North LGA is a cause for alarm, this is in line with global estimate in 2010 which reported that sodium intake is likely to rise in African population including Nigeria due to transition to higher intake of processed and convenience foods. Nigerians consume so much stock cubes that they often referred to it as "Nigerian Seasoning cube". Forgetting that they are actually an import to Nigeria (DeWitt, 2000).

### Conclusion

This research work titled "Comparative Evaluation of Ingredients, Nutrients Composition and consumption pattern of commonly consumed bouillon cubes in Mubi North Local Government Area, Adamawa State, Nigeria" has been successfully conducted. The results shows that different brands of bouillon cubes are available in Mubi metropolis of Adamawa State. The bouillon cubes were made of flavour enhancers, salts and fats which have been reported to have negative health implications when consumed in excess for a long time. Greater number of the consumers have no knowledge of these ingredient contents of the bouillon cubes nor the health implications, they consume them in large amount just for the taste and some for flavour. Maggi star is the brand mostly consumed while, ther brand contains more micro-nutrients and costs more. There is need to educate the people of the negative implications of long term consumption of excess bouillon cubes and further survey is required to set the required levels.

### Recommendations

- There is need to reform the bouillon cube formula so as to lower sodium level by the producers using other types of technology.
- Nutrition education should be embarked upon in the local government area to sensitize the people of the negative effect of consuming large quantity of bouillon cubes.
- NAFDAC registration number should be properly labeled on bouillon cube packages.

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### Conflict of Interest

There is **no** conflict of interest declared by the authors.

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