



# Inventory and recipes of anti-anaemia drinks consumed by citizens of the city of Yaoundé Cameroon

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## ABSTRACT

**Objective:** In order to contribute to the awareness of medicinal plants used for the treatment of iron deficiency anaemia that affect the citizens of the city of Yaoundé, a food survey was carried out.

**Methodology and Results:** The study involved 71 people using the prospective and descriptive method and identified 18 plants for the preparation of anti-anaemia drinks. It identified 17 species from 16 genera and 14 families with the Acanthaceae family being the most represented. Decoction and infusion were the most common methods of preparation used by population, at 55% and 35% respectively. Thirty-three (33) recipes were identified for the treatment of anaemia. After the leaves, milk was the main ingredient at 45%. Indeed, leaves were the most used organ for recipes. Among these leaves, the results indicate that the drinks made from *Manihot esculenta* (88.7%) and those made from *Graptophyllum pictum* (80.3%) were the best known and the most consumed. 80% of respondents used freezing to preserve anti-anaemia drinks.

**Conclusion and Application of the results:** The anti-anaemia drinks prepared by the populations of the city of Yaoundé listed here are an undeniable asset in the contribution to the fight against iron deficiency anaemia. More studies are needed to optimize the recipes and harmonize the quantities required for each patient.

**Keywords:** Anti-anaemia drinks, iron deficiency, food survey, medicinal plants.

## INTRODUCTION

According to the World Health Organization, 1.62 billion people worldwide are affected by anaemia, which is a major public health problem. The most affected regions of the world are Southeast Asia and Africa (Apouey *et al.*, 2016). It affects 47% of children under the age of 5 worldwide; 40% in South America, 17% in Europe and 64.6% in Africa (Diouf *et al.*, 2015; Adebo *et al.*, 2018). In Sub-

Saharan Africa, 67% of children under the age of 5 are suffering from it (Apouey *et al.*, 2016). In Cameroon, it affects 60% of children under the age of 5 and 40% of pregnant women (INS International, 2012). Anaemia is characterized by a deficiency of red blood cells or haemoglobin in the blood, which disrupts oxygen transport (Kushwaha *et al.*, 2017). The low cognitive development of

young children, the impairment of their learning abilities and their subsequent social and economic integration are some consequences (Louison, 2013). In women, iron deficiency anaemia can either lead to fatigue or increase the risk of maternal and foetal mortality (INS International, 2012). In an effort to contribute to the fight against anaemia, the Cameroonian government with international agencies such as WHO, UNICEF and FAO have adopted several prevention and management strategies. These strategies include the promotion of production and consumption of micronutrient-rich foods, enhancing the fortification procedure of foods with micronutrients, and promoting micronutrient supplementation programs (Iron and vitamin A) for groups at-risk (pregnant and lactating women, adolescent children and other vulnerable groups). However, according to the EDS-MICS (Demographic and Health Survey) I, II, III and IV reports, the prevalence of

anaemia is constantly increasing (Minhealth, 2006). Empirically, populations use natural plants to control iron deficiency anaemia. Medicinal plants are valuable resources for the majority of rural populations in Africa (Jiofack *et al.*, 2010). In addition to that, these plants are invaluable resources for the pharmaceutical industry (Awono *et al.*, 2009). In the city of Yaoundé more precisely, people still depend today on traditional medicine to meet their iron deficiency needs, despite the presence of modern medicine. The overall objective of this work is to contribute to the scientific popularization of the drinks that people use to relieve their iron deficiency anaemia. The specific objectives are: (1) identifying the different anti-anaemia drinks, (2) identifying the different methods of preparation as well as the different ingredients used in the preparations, (3) identifying the different modes of conservation.

## MATERIAL AND METHODS

**Location:** The study was conducted in the 7 borough of the city of Yaoundé and more precisely in 41 neighbourhoods and required some material. The methodology used has led to results that will be analysed. The city of Yaoundé (Latitude: 3.87, Longitude 11.52; 3-52' 12" North, 11-31' 12" East) is the political capital of Cameroon. It is located in the Central Region, and is the capital of the Department of Mfoundi, covering an area of 18,000 hectares (180 km<sup>2</sup>). It is surrounded by 7 hills that would be responsible for its particular climate and the highest of

which are located on the west and northwest sides. The climate of Yaoundé belongs to the Equatorial Guinean area, which is characterized by four seasons: a major rainy season (mid-August to mid-November), a major dry season (mid-November to February), a minor rainy season (March to May) and a minor dry season (between July and mid-August). The average annual rainfall ranges between 1500 and 2000 mm and the average temperature is 24°C. The minimum average temperature is 22.5°C in July and the maximum average temperature is 34, 6°C in April.

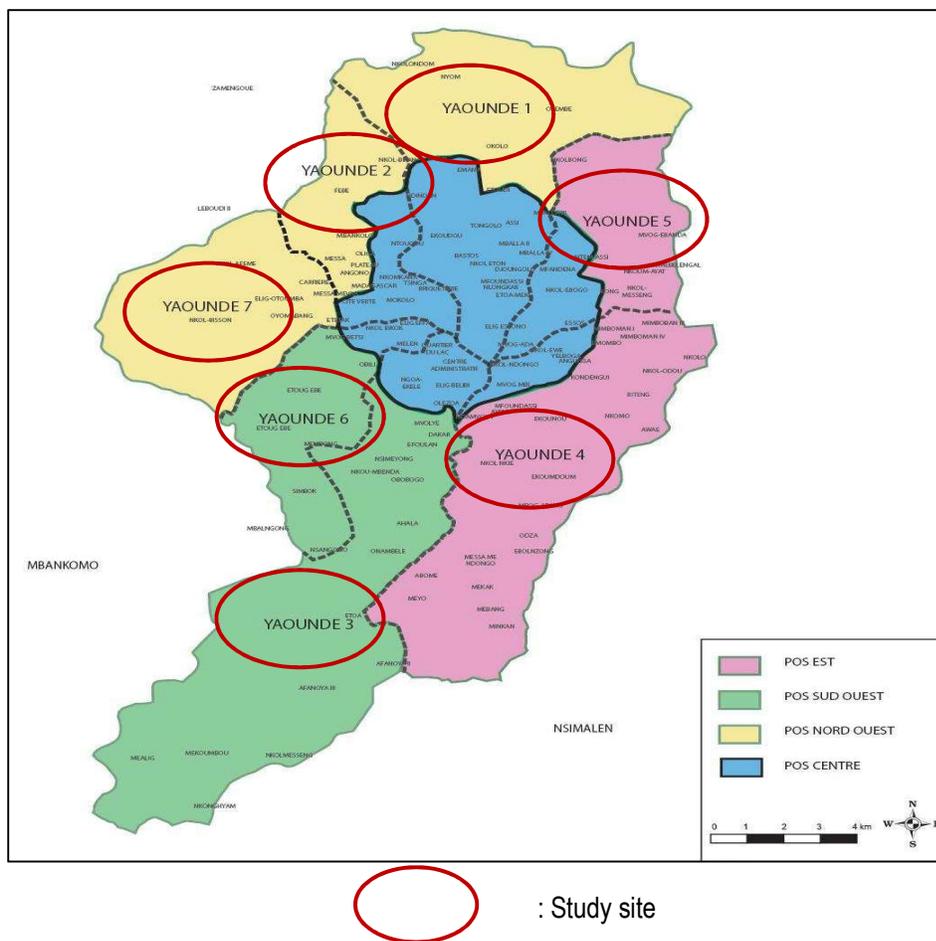


Figure 1: Yaoundé Urban Community Location Map (Map data © 2019 Google)

**Material:** The field material includes: survey sheets (for the collection of information from respondents); a mobile phone (to take pictures of the different plants to easily identify them with the national herbarium and the different ingredients); newspapers (for the preservation of samples collected in the field). The plants were harvested in a fresh state in their biotope, making sure of the harvest period of each of them. Harvesting was done during flowering or fruiting because of the richness of these medicinal plants. After harvest, these plants were identified using the Cameroonian flora.

**Methodology:**

**Pre-survey**

Statistical data on decoctions, infusions and macerations of anti-anaemia drinks based on extracts from the leaves of *Manihot esculenta* or *Graptophyllum pictum* in Cameroon in general and in the city of Yaoundé in particular being very few available in the literature, a survey was undertaken.

The purpose of the survey was to:

- Identify information that can be used to establish a complete survey sheet (what are the different drinks, their preparation methods (decoctions, infusions, macerations and other methods of extracting plants commonly) and their shelf life? Are the people satisfied when taking in such drinks?);
- Obtain the opinion of the populations on the relevance of this study to overcome the problem of iron deficiency with natural resources.

This survey was conducted in the city of Yaoundé (between the 1<sup>st</sup> of October and the 4<sup>th</sup> of December 2017) among twenty (20) female mothers, traditional practitioners and sellers of the so-called traditional remedies made from leaves, bark of trees, flowers, fruits and roots plants by interview broken down into the following:

- Five (05) women selling traditional medicines from two neighbourhoods chosen by convenience (mokolo and Madagascar, both located in the 2<sup>nd</sup> municipality);

- Five (05) traditional women in two neighbourhoods chosen by convenience (*Cité-verte* and *Ecole de police* located in the 2<sup>nd</sup> borough);

- Ten (10) female mothers chosen by convenience. Considering the wide variability of their knowledge of plants, how they are prepared and how they are administered, depending on the age groups for children and the physical condition for women, this pre-survey was performed in "interview" mode. That is, the questions were asked and explained to the respondents by the investigator.

At the end of this pre-investigation, it follows that there are several so-called anti-anaemia drinks made from the leaves of plants such as the leaves of *Vernonia amygdalina*, It should be noted that those based on these last two plants were the most prepared. Hence the need for, *Telfairia occidentalis* (Okomobong Eremomastax *speciosa* (Pinkuidjum in Ghomala'a), *Hibiscus sabdariffa* Linn (*Folere* in *Fufulbe*), *Manihot esculenta* (Mbong in Ewondo), *Graptophyllum pictum* (caricature-plant) It should be noted that those based on these last two plants were the most prepared. Hence the need for a survey to have scientific data on these drinks.

**The study**

was prospective and descriptive conducted during the months of July and August 2018, using a method of targeted sampling.

**RESULTS**

**Sex and treatment places for anaemic people:** Out of the seventy-one people surveyed, both the male and female sexes are represented in the study population with the female sex (69%) is the most represented. It

Those involved in the survey included plant leaf sellers, phytotherapists, parents of children, women of childbearing age in the city of Yaoundé.

The inclusion criteria were:

- Have ever suffered from anaemia or have a child/or loved one who has already suffered from anaemia;
  - Have already produced and used a traditional anti-anaemia drink based on extracts from the leaves;
- The non-inclusion criterion was:
- have no knowledge about anti-anaemia drinks.

**Survey objectives**

From the responses obtained from the pre-survey, the following objectives were defined for the survey:

- ✓ Identify the socio-demographic characteristics (sex, neighbourhood, region of origin) of housewives and people producing and/or consuming the anti-anaemia drinks collected;
- ✓ Identify the different methods of preparation, ingredients and proportions used in the preparation of the anti-anaemia drinks collected;
- ✓ Determine the methods of preservation of different types of anti-anaemia drinks.

**Data analysis:** Field data was recorded in an Excel spreadsheet, then analyzed statistically and processed by SPSS version 20.0 software for Windows.

was observed that the most consumed drinks were those made at home with a frequency of 62% and that the least suitable place for this manufacture was in traditional practitioners (5.6%) (Table 1).

**Table 1:** Breakdown of respondents by sex and treatment places for anaemic people

Settings		Number	Frequency (%)
sex	Male	22	31
	female	49	69
Places of treatment	Hospital	23	32.4
	House	44	62
	Marabout	0	0
	Traditional healers	4	5,6
	other	0	0

**Ingredients, quantities and preparation of anti-anaemia drinks based on extracts from the leaves of these plants**

Table 2: Recipes for different anti-anaemia drinks identified

N° ADs	Main ADs	Scientific names of plants	Ingredients entering the preparation	Quantities	Preparation method	Conservation method
1	AD cassava leaves	<i>Manihot esculenta</i> (Euphorbiaceae)	-Cassava leaves -Unsweetened concentrated milk -Canned tomato - Grenadine soft drink -Lemon -Egg yolk -Malta Guinness -Water - whole egg (village egg) -Beetroot	-1 kg of leaves for 450 mL of extracts -500 to 700 L of milk -1 packet -0.065 cL -2 fruits -2 -0.55 cl -1L -2 -2 fruits.	-a) Crush a certain amount of leaves and extract the juice by making a simple manual pressing. After sieving, add the milk to a certain concentration until the drink is well concentrated, nice and homogeneous. - b) Crush a certain amount of leaves and extract the juice by making a simple manual pressing. After sifting, add the tomato, soft drink, and beetroot until the drink is well concentrated, nice and homogeneous. - c) Crush a certain amount of leaves and extract the juice by making a simple manual pressing. After sieving, add milk and other ingredients until the drink is well concentrated, nice and homogeneous.	Make the quantity to drink
2	AD caricatural leaves	<i>Graptophyllum pictum</i> (Acanthaceae)	-Caricatural leaves -Water -Sugar -Lemon	-665g leaves -2L -4 tiles -1 fruit	- a) After harvesting the leaves, wash, pare, drain and boil them in water (decoction). After cooling, sieve the drink and drink. - b) After harvesting the leaves, wash, pare, drain and infuse them. After cooling, sift the beverage and drink.	Freezer
3	AD fruit or concentrated tomato	<i>Solanum lycopersicum</i> L. (Solanaceae)	- Tomato concentrate -Unsweetened concentrated milk -Canned tomato -Whole eggs - <i>bonbon alcoolisé</i> -Fruit tomato - vimto/grenadine/sprite	-1 packet -149 mL  -1 packet -2 -3 sweets -2 fruits -0.65 cL	- a) Mix the tomato concentrate with the milk until you get a smooth paste and then drink - b) Mix the tomato concentrate with milk and other ingredients (soft drink or tonic or soda or Malta) until a smooth paste is obtained and drink - c) Crush the fruit tomato and mix it	Make the quantity to drink

			soft drink -Whole village egg -Grapefruit -Tonic/Soda Guinness -Malta	-2 fr- -0.23 cL -0.33 cL -0.55 cL	with the milk and the Malta Guinness until you get a homogeneous paste and drink.	
4	AD Beetroot	<i>Beta vulgaris</i> L. (Amaranthaceae)	-Beetroot -Unsweetened concentrated milk -Water -Carrots -Village eggs -Malta Guinness -Grapefruit -Sugar	-5 ripe beet fruit -149 mL milk  -3L -5 fruits -2 -0.55 cL -3 fruits -4 squares	- a) Cut the beetroot fruit, put in water and boil. After cooling, add the unsweetened condensed milk. - b) Crush the beetroot fruit with the grapefruit juice obtained after pressing the fruit, then add the unsweetened condensed milk to the mixture and drink. - c) Crush the carrots and beets. After obtaining the juice, add the milk and sugar then drink. - d) Crush the beets. After getting the juice, add eggs and Malta then drink.	Freezer
5	AD Red leaves on one side and green on the other	<i>Eremomastax speciosa</i> (Acanthaceae)	-Red leaves on one side and green on the other -Water - Unsweetened concentrated milk Eggs -red wine -grapefruit	-665gof leaves  -2L	- a) After harvesting the leaves, wash, pare and infuse or boil them in water (decoction), sift and let them cool and drink. -b) After harvesting the leaves, wash them pare them, infuse or boil them in water (decoction), sift and let them cool. Add the ingredients and drink.	Freezer
6	AD Foléré	<i>Hibiscus sabdariffa</i> L. (Malvaceae)	-Calyces of foléré -Water -Sugar -Pineapple -Unsweetened concentrated milk -Lemon	-500g -2L -100 g -1 fruit -149 mL  -2 fruits	-a) After decoction or infusion of the Calyces of foléré, let them cool, sift and drink. -b) After decoction or infusion of the Calyces of foléré, let them cool, sift, add the sugar and then drink. - c) After decoction or infusion of the	freezer

					Calyces of foléré, let them cool, sift, add the other ingredients and then drink.	
7	AD Gonthù Leaves	(Acanthaceae)	-Gonthù Leaves -Water	-665 of leaves -2L	After harvesting the leaves, wash, pare, boil in water (decoction) before sifting, then let them cool, and drink.	Freezer
8	AD Grapefruit Egg Mixture	<i>Citrus maxima</i> (Rutaceae)	-Whole eggs -Grapefruit -Unsweetened concentrated milk -bonbons alcoolisés -Tonic/soda -Canned tomato	-3 eggs -2 fruits  -149mL -3 bulging -0.23 cL -1 packet	- a) Mix the eggs with the milk and grapefruit until you have a smooth paste and drink. - b) In a bottle, put the <i>bonbons alcoolisés</i> with tonic/soda; allow the mixture for at least 6 hours to add the unsweetened condensed milk and whole eggs, then mix until a smooth paste is obtained and drink. - c) Mix the egg yolks, with canned tomato and milk until a smooth leg is obtained and drink.	Make the quantity to drink
9	AD Eucalyptus Leaves	<i>Eucalyptus globulus</i> (Myrtaceae)	-Eucalyptus leaves -Water	-665g of leaves -2L	After harvesting the leaves, wash, pare and boil them in water (decoction)/ or infuse before sifting and then letting them cool and drink.	freezer
10	AD Okonghobon Leaves	<i>Telfairia occidentalis</i> (Curcubitaceae)	-Okonghobon leaves -Water -Unsweetened concentrated milk -cooked leaves	-665g of leaves -2L  -149 mL -2g	- a) After harvesting the leaves, wash them pare and boil them in water (decoction). Sift, let it cool, and add the milk and drink. - b) Cook the leaves and consume them.	freezer
11	AD Mixture based on maize	<i>Zea mays</i> (Poaceae)	-Flour of corn -Romarrin -Village eggs -Honey	-200g -100g -2 -1L	Mix all ingredients until you have a homogenous paste and drink.	At room temperature
12	AD carrot juice	<i>Daucus carota</i> (Apiaceae)	-Carrot juice -Beet juice Unsweetened concentrated milk	-200g -200g -500 mL	- Peel the carrots and the beetroots. Wash, cut them into slices, put them in a blender and then make a manual pressing followed by a sieving and	Make the quantity to drink

					after adding unsweetened condensed milk, drink	
13	AD Cocoa bark	<i>Theobroma cacao</i> L. (Malvaceae)	-Cocoa bark -Honey -Water	-500g -500 mL -2 L	Boil the cocoa bark mixture, let cool, sieve, and add honey and drink.	freezer
14	AD Pawpaw Leaves	<i>Carica papaya</i> L. (Caricaceae)	- Pawpaw leaves -Water -Sugar	-665g of leaves -2L -2 squares	- a) After harvesting the leaves, wash them pare and boil them in water (decoction). Sift, let them cool and drink. - b) After harvesting the leaves, wash them pare and boil them in water (decoction). Sift, let them cool then add sugar and drink	freezer
15	AD Unsweetened Concentrated Milk	//	-Unsweetened concentrated milk	1tin i.e. 149 ml	Open the tin and drink.	Room temperature
16	AD Honey	<i>Apis mellifera unicolor</i> (Apinae)	-Honey	2 tablespoons or 10 ml	Take a quantity and drink.	Room temperature
17	AD Pineapple + Tea	<i>Ananas comosus</i> (Bromeliaceae)	-Pineapple peel -Green tea -Water	-50g -2 sachets -3L	Boil some water and add the pineapple peels. A few minutes after, add green tea and then boil for another 10 minutes. Remove the pot from the fire, let cool, then sift and drink.	freezer
18	AD Sesame Seeds	<i>Sesamum indicum</i> (Pedaliaceae)	-Sesame seeds -Water -Unsweetened concentrated milk -Sugar	-200g -2L  -1 box i.e. 149 ml -4 squares	Mix all ingredients until you have a smooth paste and drink.	Freezer

AD = Antianemia drink

Table 2 presents 18 main plants used for the preparation of the listed anti-anaemia drinks, the ingredients and the quantities used in the preparation of these drinks and the methods of preparation of these drinks. The preparation methods column shows that 33 recipes have been identified. Indeed, the beet-based drink (4) alone has 4 recipes (a, b, c, d). Drinks 1, 3, 6, 8 each have 3 recipes. While the drinks 2, 5, 10, 14

each have 2 recipes, investigations have shown that the other drinks are made in only one way each. For a total number of 71 people surveyed, it appears that 88.7% of those surveyed knew how to prepare the drink based on extracts of *M.esculenta* leaves (1) and 80.3% knew how to prepare the one based on extracts of *G.pictum*. (2) So a good part of the respondents consumed these drinks. (Fig 3)

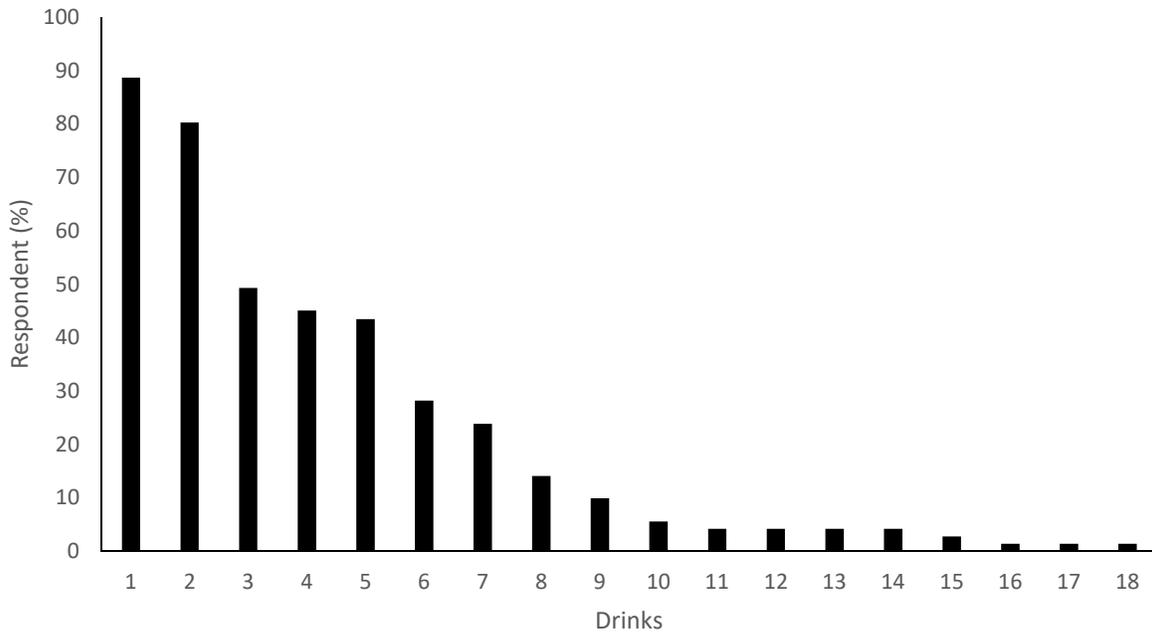
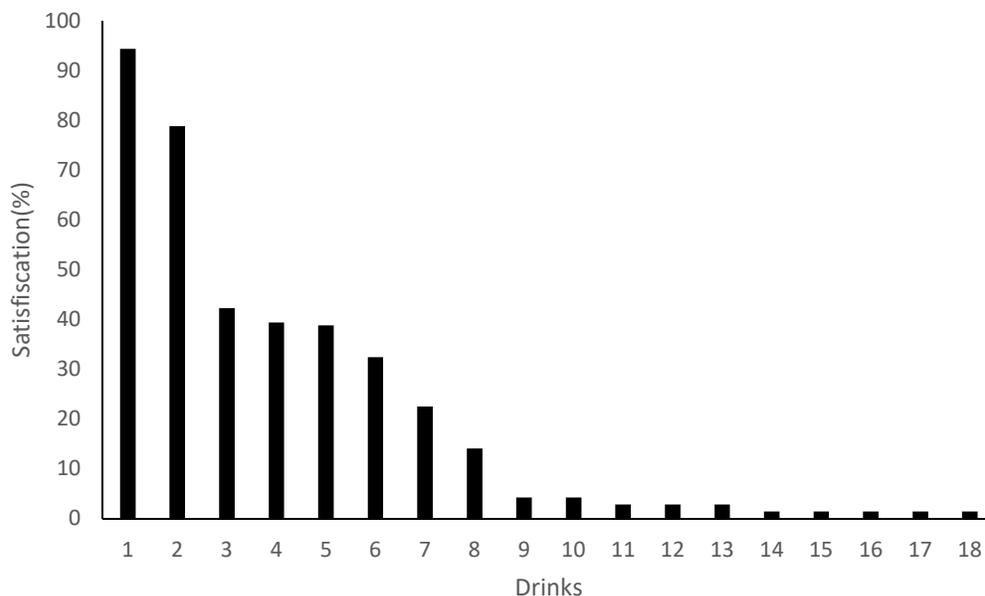


Figure 2: Different anti-anaemia drinks identified in the city of Yaoundé

**Satisfaction:** Of the 71 people surveyed, the figure 4 shows us that 94.4% of these people admitted being satisfied with the extracts from the leaves of *M.esculenta* and 78.8% by that with *G. pictum*. – Drinks

from *Eremomastax speciosa*, *Solanum lycopersicum* L, *Hibiscus sabdariffa* gave a satisfaction percentage of 42.3%, 39.4%, 38.8%, 32.4%, respectively.



**Figure 3:** Frequency of respondents who were satisfied with a specific BA

## DISCUSSION

The data collected identified 18 plants used in the preparation of anti-anaemia drinks. They also identified 17 species from 16 genus and 14 families with the most represented been the Acanthaceae family. Other studies have been conducted around the world, in Africa and in Cameroon on medicinal plants with anti-anaemic properties. Indeed, studies made by Peter *et al.*(2014) in Tanzania and Nga *et al.*(2016) in Cameroon showed that plants such as *Manihot esculenta*, *Carica papaya L*, *Hibiscus sabdariffa* *Cocos nucifera*, *Eremomastax speciosa* and *Graptophyllum pictum* are similar to those found in this study. Also, studies by Zhang *et al.* (2014) in China and Kushwaha *et al.* (2017) in India have shown that other plant species found in nature are used as anti-anaemics. In Cameroon, the work carried out by Leslie *et al.* (2015) on *Telfairia occidentalis* relate to the therapeutic properties of these leaves, in particular the management of anaemia. Thus, several plants have anti-anaemic potential on which researchers should pay more attention to better explore them so that humans benefit from them. By grouping the anti-anaemia plants identified in this study, herbaceous plants represented the majority of the morphological type with proportions of 37.50%. This result would be justified by the intensive use of leaves in commonly used preparations and manual harvesting methods (Peter *et al.*, 2014). The plant parts used were classified in order of decreasing importance: leaves (73%), fruit (8.5%), bark

(7%), chalice (7%), and the rest of the parts used are represented by a rate of 4.5%. It is possible that the leaves of a plant are the part that contains the most interesting substances. In general, the vegetables studied are rich in iron. Leaf vegetables occupy an important place in the basic diet of many populations, since they provide humans with a good amount of several nutrients such as Ca, Fe, Mg, Zn, ascorbic acid, riboflavin, thiamin, fibre and protein (Ejoh *et al.* 2017). Indeed, Ayodeji (2005) found an average value of 34.8% protein in the leaves of *Manihot esculenta*. Among these leaves, the results indicate that the drinks made from *Manihot esculenta* (88.7%) and those made from *Graptophyllum pictum* (80.3%) were the best known and most consumed (Fig 2). Also, their satisfaction percentage was 94.4 and 78.9 respectively (Fig 3). Thirty-three recipes were identified. The results obtained from the evaluation of secondary metabolites, combining both pharmacology and chemical identification, were surprising. For most of them confirm the therapeutic indication collected, showing the relevance of traditional knowledge. Hence, studies carried out by Kushwaha *et al* in 2017 showed that phytochemical analysis revealed the presence of several chemical groups that are alkaloids, tannins, flavonoids, polyphenols, quinones, sterols, terpenes, cardiac glycosides, saponins and leucoanthocyanins. They have antioxidant power, promote regeneration of tissue, reduce the permeability of blood capillaries and

increase their resistance to haemolysis. The ingredients associated with analysed plants were unsweetened concentrated milk, eggs, grapefruit, honey, tomato and sugar. With a percentage of 45%, milk was the major ingredient. This is an advantage for the formula, because milk mostly contains protein (over 40%) which facilitates the intestinal absorption of non-heminic iron. In addition, Theau, 2017 claimed that the body easily assimilates heminic iron (animal) in addition to non-heminic (vegetable) iron. Also, grapefruit been in the citrus family contains mostly vitamin C (over 50%) which also facilitates the absorption of non-heminic iron inside the duodenum (Djuikwo *et al.*, 2015). Anaemia is a decrease in the ability of the blood to carry oxygen to cells. It is characterized by a set of unpleasant symptoms such as intense fatigue, shortness of breath and lack of energy. Fortunately, through diet it is possible to limit the risk of anaemia and improve the availability of iron stores. Foods rich in iron, vitamin B9 and vitamin B12 are the ultimate anti-anaemia foods. Indeed, it is known that among the essential points of the anti-anaemia diet we can cite things like a good intake of vitamin C, increased consumption of fruits and vegetables. So the presence of lemon (recipes 1,2,6), tomato (3,8) carrots (4,12), grapes (3,4,8) and various leaves (1,2,5,7,9,10, 14), in the recipes of the listed drinks is beneficial. The dietary fibre found in corn (recipe 11) is very useful in the fight against anaemia. Their richness in iron (up to 10mg per 100g of bran) and vitamins B9 should be emphasized. Foliates are present in the husk of cereals (bran and germ). Recipes 11, 13 and 16 contain honey. Bhuvanewari *et al.*, (2018) found that honey is a potent source of iron, copper and manganese. When these elements are combined, they aid in haemoglobin synthesis. Honey is therefore a powerful weapon against anaemia. Also the sugar used as an ingredient in recipes 2, 4,6,14 and 18 would play an important role in the fight against anaemia. The links between glucose, anaemia and HbA1c are complex and not yet fully elucidated. Diabetes can contribute to anaemia through reducing

## CONCLUSION AND APPLICATION OF THE RESULTS

A survey made in Yaoundé lead to identify 18 plants for the preparation of anti-anaemic drinks. Leaves were the most used part. 33 plant recipes have been identified. The recipes prepared with *M.esculenta* and *G. pictum* were recurrent and the most satisfactory. It would be interesting to explore the physico-chemical parameters and even the nutritional value of these plants to better

absorption of iron, gastrointestinal bleeding and through diabetic complications that cause anaemia (Christy *et al.*, 2014). The sesame (*Sesamum indicum*) was used in recipe 18. Zhenwei *et al.* 2012. asserted that sesame seeds and oil are consumed as a staple food. Sesame seeds are used in traditional medicine for many diseases treatment. A study has revealed that sesame seed and oil is an important source of many healthy components such as polyunsaturated fatty acids, phenolic phytochemicals in sesame seed and oil makes it an excellent source of bioactive components which may provide potential protection against anaemia. Rehab and Rania (2019). One of the causes of iron deficiency is the low bioavailability of iron. Indeed, the tannins present in tea interfere with the absorption of iron when they are consumed during meals. Tea leaves rank in the top tier of foods containing the most iron (about 10-40 mg / 100g in green tea). However, most authors overlook the fact that the infusion only extracts very limited amounts of iron from the leaves. Thus, a tea, even very rich in iron, will release only about 0.1-0.2 mg / L of infused water (Zijp *et al.*, 2000). Considering this knowledge, one wonders whether the recipe (17) from this study containing green tea should not be banned. Within the 18 plants generally identified, extraction was the most widely used method for obtaining anti-anaemia drinks. In this study, we had extraction by pressing (7%), grinding (8%), infusion (35%) and by decoction (55%). This is not surprising as studies conducted by Rashid *et al.*, in 2018 have shown that herbal infusions and decoctions relieve anaemia problems. The infusion is intended to extract vitamins and volatile substances from leaves and flowers and the decoction is intended to extract mineral salts and bitter molecules of plants. Out of the 18 plants surveyed, 80% of respondents used freezing, 17% used the ambient temperature to preserve anti-anaemia drinks, and 3% remaining prepared the amount to drink instantly. Indeed, freezing is a method of conservation by excellence at negative temperatures. It has the advantage of stopping all metabolic activity.

understand the origin of their effectiveness. Additional studies would be necessary to ensure that the proportions of the ingredients, the methods of preparation and conservation and the quantities are adequate for better management of anaemia according to the age, sex and physiological state of the patients.

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