

Practices and Attitudes Assessment of Street Vendors of Hot Beverages Made of Coffee, Tea, Milk or Cocoa with Coffee Carts

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Abstract In Côte d'Ivoire, the sale of hot beverages made of coffee, tea, milk or cocoa powder by street vendor has grown, especially in Abidjan city. Despite the potential of hot beverage to contribute to Ivorian food security, no detailed information on the marketing of hot beverages is available. This study aimed to assess the knowledge, behavior and practices of these street beverage vendors. The preparation methods, sale characteristics with regards to beverage hygiene and safety were evaluated. Beverage samples were purchased from street hot beverage vendors. Temperatures of water stored in thermos for coffee and ready-to-drink hot beverages served to consumers were taken by digital thermometer. Preparation methods of street vendors have been described. The study revealed that, most street vendors were foreigners (88.0%) and illiterate (71.3%). Street vendors preferred drinking coffee (40.7%) than tea (33.3%). For them, coffee offered an energy boost to sell. According to vendors, the consumers liked to drink tea (42.7%), followed by coffee (38.7%), then coffee with milk (14%) and at last by cocoa powder (0.7%) beverage. According to vendors, 87.7% of male preferred drinking coffee and 42% of female liked tea. Most street vendors consumed only one cup of coffee per day (72.7%) and twice a day (48.1%) for tea. Adult (24.7%) preferred tea while young people (62.0%) preferred coffee and children (8.7%) preferred cocoa powder beverage. The temperature measurements of hot beverages served to consumers and water stored in thermos varied from vendor to vendor showing the variability of preparation methods. This variation of temperature could impact the marketability or organoleptic, even hygienic quality of hot beverages sold. Therefore, it is important to prepare hot beverages (teas and coffees) using the correct method for the drink ordered by the consumers.

Keywords: hot beverages, vendors, food safety, coffee, tea, milk, cocoa

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1. Introduction

Street foods are defined by the Food and Agriculture Organization (FAO) as "ready-to-eat foods and beverages sold and prepared by vendors or hawkers in streets or other public places" [1]. These foodstuffs provide a convenient diet for many people in developing countries [2,3], and approximately 2.5 billion people eat street food every day, with the consumption supporting the livelihood of millions of low income people and contributing to the economy [4,5].

Street foods are highly demanded both by the sellers and consumers because of the taste, easy availability, low cost, cultural and social heritage connection [6,7]. Street foods are consumed in many countries as food, drinks, and snacks which reflect traditional cuisine culture in countries together with their content, preparation, sales methods, and consumption ways [8,9]. However, the safety of street foods remains a major concern in developing countries, including Côte d'Ivoire. Indeed, preparation of street foods can cause cross contamination of raw and processed food during insufficient cooking and food storage [10,11]. Also, staff hygiene is one of the main factor causing foodborne diseases [12].

Among street foods, hot beverages specially prepared by addition of hot water with other ingredients are important sources of nutrients and bioactive compounds. In Côte d'Ivoire, the sale of hot beverages by street vendors has recently grown, especially in Abidjan District. These street vendors use hand push mobile coffee carts to prepare hot beverages made of coffee, tea, milk or cocoa powder.

Coffee drink is one of the most popular beverages consumed worldwide, with a global production output of *ca.* 7 million tons in 2010, compared to 6.7 million tons in 1998-2000 [13]. People drink coffee to relax and enjoy its diverse flavors and aromas. It has physiological and psychological effects beyond its nutritional benefits [14]. Coffee is a rich source of caffeine that provides mild stimulant effects but may be undesired by certain consumers. To cater for this need, manufacturers have developed processes to decaffeinate coffee, applied to the green bean and which remove caffeine to a large degree [13]. Coffee typically contains more caffeine than most other beverages, and is widely consumed [15,16]. Thus, it contributes significantly more to overall caffeine consumption within the population, particularly in adults [17]. Some studies also showed that such drinks may be consumed by young adults, teenagers, college students, athletes, and military personnel [18,19,20].

Tea is the most frequently consumed non-alcoholic refreshment beverage in the world after water [21,22]. This is due to its refreshing, mild stimulant properties and health-promoting purposes [13]. Bovine milk and dairy products have been part of the human diet, from birth to old age [23]. Farm characteristics and hygienic practices significantly affect milk products quality [24,25].

Despite the potential of hot beverage to contribute to Ivorian food security and reducing poverty levels through income generation, no detailed information on the marketing of hot drinks is available. Therefore, the aim of this study was to assess preparation methods, vendor characteristics and environmental conditions of hot street beverages.

2. Materials and Methods

2.1. Sampling Procedure

The study was carried out in Abidjan, a city of Côte d'Ivoire, in West Africa. It is the economic capital and the country's major urban center. This study was conducted from July to December 2019 in five communes of Abidjan: Abobo, Adjamé, Yopougon, Cocody and Port-Bouet. A total of 150 street hot beverage vendors (30 respondents per commune) were selected for the interview. Vendors of street beverage products were selected based on their willingness to participate to this study. A survey was carried out to describe the attitudes, practices of vendors, and the preferences for hot beverages. Sales methods, preparation methods, consumption ways and environmental conditions were observed during preparation by street vendors.

2.2. Survey Conducting

The survey was conducted according to the method of [26]. Methods of collecting data were face-to-face interviews using standardized questionnaires (written surveys)

for vendors. Written surveys allowed asking questions to consumers of hot beverages. The questionnaire was used for vendors of street hot beverages of tea, coffee, milk, coffee with milk or cocoa powder. The survey was conducted in street areas where we found street vendors in Abidjan city. In the selected commune, vendors predisposed who were selling, were randomly questioned. The questionnaire focused on themes, namely hygiene of vendors, beverage consumption, gender and sex of vendors. Socio-demographic information such as age, gender and level of education were also collected. In addition, consumption practices and environmental hygiene were observed during the survey. The questionnaire survey was coupled with direct observation on the selected vendors.

2.3. Survey Description

Street beverage vendors with coffee carts were interviewed in this study. This survey has been conducted for vendors of all ages who sold hot beverages in streets. The respondents were about 150 volunteer vendors. This survey has been conducted for vendors of all ages. Vendor characteristics included age, gender and presence of vendors in street.

2.4. Inclusion Criteria

The questions were only asked to street vendors using hand push mobile coffee carts for preparation and sale of street hot beverages.

2.5. Temperature Intake

Samples were purchased from street hot beverage vendors (in streets, in markets or stations) and the temperatures of water stored in thermos for coffee and ready-to-drink hot beverages served to customers were taken by digital thermometer (Chektemp 1 by HANNA, Romania).

2.6. Data Analysis

The data obtained from the questionnaires and observation checklists were analyzed using the SPSS version 20.0 statistical software package, and then exported to Microsoft Excel to calculate the various scores. Descriptive analyses were used to summarize the variables of interest and determine relationships between them. The results were expressed as mean \pm standard deviations (\pm SD), frequencies, and percentages. The Chi-squared frequency test (χ^2 test) was used to test the relationships between the variables. Statistically significant differences were based on 95% confidence limits, i.e., $\alpha = 0.05$ or $p < 0.05$.

3. Results

3.1. Description of Hand Push Mobile Coffee Cart and Process of Street Beverage Preparation

Hand push mobile coffee carts were used to transport and sold hot beverage products (coffee, tea, milk, milk with coffee or cocoa powder) bags, ingredients (sugar,

lemon and mint) and materials (thermos for hot water, lemon squeezer, knife, scissors) for the preparation of hot drinks for consumers. It could include hidden storage, hidden storage for thermos reserve of hot water.

A small porous bag containing tea leaves or powdered tea, onto which boiling water was poured in order to make a drink of tea. The first step in preparing and serving hot beverage by street vendors is to put beverage powder in disposable cups. The second step was to add sugar and then hot water stored in thermos for coffee and selected ingredients to match the needs of consumers (customer). Beverage powder products of tea, coffee, milk, coffee with milk or cocoa powder bags were used to prepare ready-to-drink beverages that are served hot to consumers as customers in non-recyclable cups or disposable cups (Figure 1 and Figure 2).

3.2. Temperature Intakes with Street Beverage Vendors

Temperature measurements of hot beverages and hot water stored in thermos used to prepare these beverages were taken in order to assess beverage safety because of the variability of preparation methods. Temperature intakes of hot beverages and water stored in thermos varied according to vendors. For hot water stored in the thermos, the temperature ranged from 59.8 to 90.4°C ($74.9 \pm 6.8^\circ\text{C}$). After mixture by hot beverage vendors and served to customers (ready to drink), temperature ranged from 50.5 to 70.1°C for coffee served with average of $61.6 \pm 4.3^\circ\text{C}$, from 50.6 to 74.5°C ($60.8 \pm 4.1^\circ\text{C}$) for teas, from 49.9 to 70.3°C ($60.5 \pm 4.4^\circ\text{C}$) for milk, from 50.2 to 69.0 °C ($61.1 \pm 4.4^\circ\text{C}$) for coffee with milk and finally from 51.6 to 68.7°C ($60.9 \pm 5.4^\circ\text{C}$) for cocoa powder beverage (Table 1).

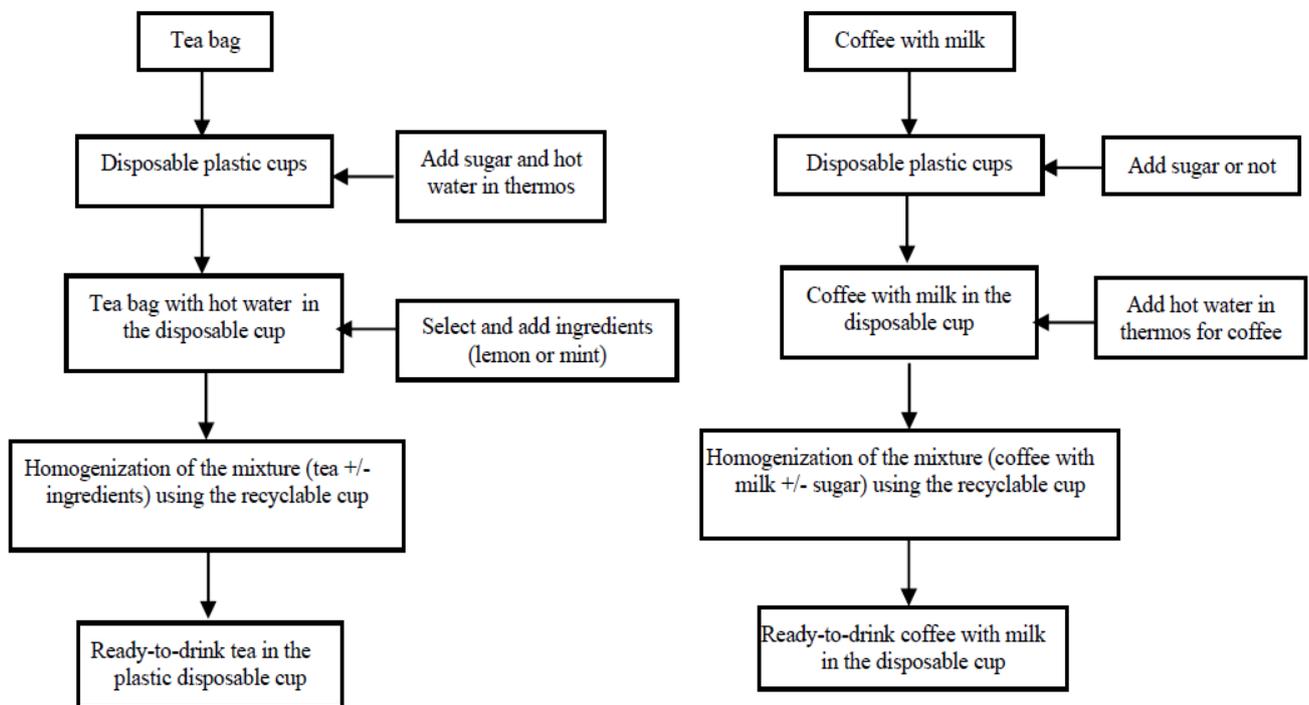


Figure 1. Process of tea and coffee with milk preparation by street vendors served to consumers

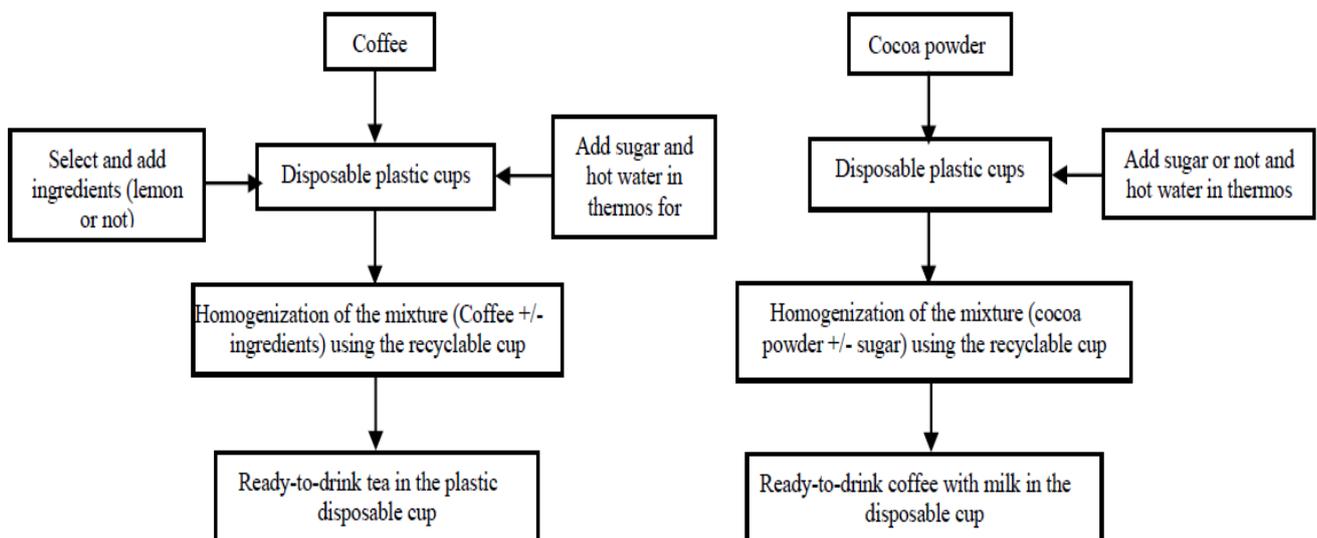


Figure 2. Process of coffee and cocoa preparation by street vendors served to consumers

Table 1. Temperature measurements of hot water used stored in thermos and hot beverages ready to drink

Communes	Thermos water (°C)	Coffee (°C)	Tea (°C)	Milk (°C)	Coffee with milk (°C)	Cocoa powder (°C)
Abobo	74.3 ±5.2 ^a	63.4±3.7 ^c	62.0±4.1 ^b	59.9±4.7 ^a	59.9±4.0 ^a	ND
Adjamé	72.6±7.8 ^a	64.1±4.2 ^d	60.1±3.9 ^b	61.4±3.9 ^a	60.2±5.8 ^a	ND
Yopougon	74.2±6.9 ^a	59.0±4.3 ^a	61.3±3.8 ^b	60.6±4.8 ^a	60.4±5.0 ^a	60.9±5.4
Port-Bouet	74.8±5.4 ^a	59.9±4.0 ^a	58.4±3.1 ^a	60.8±4.7 ^a	61.5±3.2 ^a	ND
Cocody	78.6±6.9 ^b	61.9±3.2 ^b	62.2±4.4 ^b	59.6±3.8 ^a	63.2±2.7 ^b	ND
Average (°C)	74.9±6.8	61.6±4.3	60.8±4.1 ^b	60.5±4.4	61.1±4.4	60.9±5.4

The values in the same column with similar superscripts are not significantly different from each other ($p < 0.05$). ND: not determined.

3.3. Socio-demographic and Cultural Characteristics of Hot Beverage Vendors

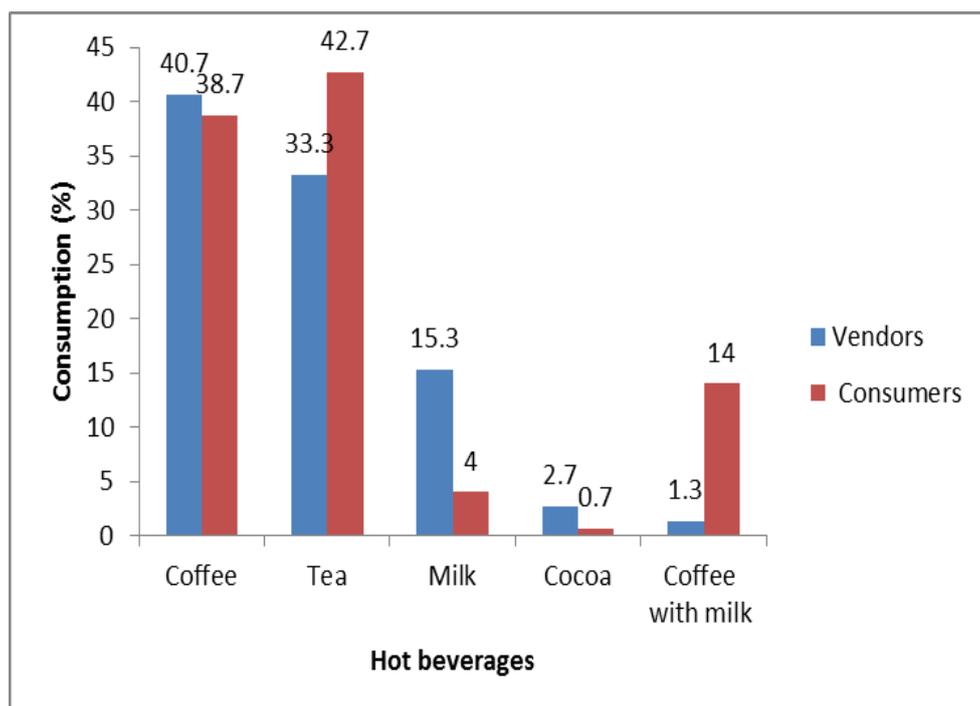
Table 2 summarizes the data on demographic and cultural characteristics of vendors. All hand push mobile cart vendors were male. The age of vendors ranged from 20 to 34 years (mean = 28.3 ± 7.5) were the dominated group (66.0%). They were predominantly from Niger (33.3%) followed by Guinea (28.0%), Mali (18.7%). Among these vendors, most were Muslims (92%) and then Christian (7.3%). However, vendor education level showed that most (71.3%) were illiterate and 17.3% had a primary level (Table 2).

3.4. Preferences of Hot Beverages by Consumers

The survey revealed that street vendors preferred coffee (40.7%), followed by tea (33.3%), then milk (15.3%). According to vendors, 42.7% of consumers preferred tea, followed by coffee consumers (38.7%), then coffee with milk (14%) and at last by cocoa powder (0.7%) consumers (Figure 3). A negative correlation was found between hot beverage preferred by vendors and consumers ($r = -0.023$, $p = 0.778$).

Table 2. Socio-demographic and cultural data on hot beverages vendors

Characteristic (n=150)	n (%)
Sex	
Male	150 (100)
Age (year)	
5-14	0 (0)
15-19	23 (15.3)
20-34	99 (66.0)
35-49	28 (18.7)
> 50	0 (0)
Nationality	
Ivoirian (Côte d'Ivoire)	12 (8.0)
Guinean (Guinea)	42 (28.0)
Malian (Mali)	28 (18.7)
Burkinabe (Burkina Faso)	16 (10.7)
Nigerien (Niger)	50 (33.3)
Other	2 (1.3)
Religion	
Muslim	138 (92.0)
Christian	11 (7.3)
Animist	1 (0.7)
Other	0 (0)
Education level	
Illiterate	107 (71.3)
Primary school	26 (17.3)
Secondary school	16 (10.7)
University	1 (0.7)

**Figure 3.** Preferences of hot beverages by vendors and consumers

3.5. Vendor's Consumption of Hot Beverages

Table 3 shows the number of hot beverage cup drunk per day by the vendors. Majority of street vendors consumed only one cup of coffee per day (72.7%). For tea, vendors consumed twice a day (48.1%). The difference between hot beverages drunk and the number of beverage cup drink per day were statistically significant ($\chi^2 = 37.360$, $p = 0.002$).

3.6. Hot Beverage Preferences Based on Consumers' Sex

Figure 4 shows hot beverage preferences by consumers' sex according to vendors. According to vendors, 87.7% of males preferred coffee and 42.0% of females preferred tea.

3.7. Consumer's Age Groups

According to vendors, among the consumers, young people (62.0%) preferred coffee, children (8.7%) preferred

drinking cocoa powder beverage and adult (24.7%) preferred drinking tea. Also, tea (36.0%) was consumed by all ages. Milk (62.0%) and coffee with milk (40.0%) were consumed by all ages (Table 4).

3.8. Socio-Economic Characteristics of Hot Beverage Street Vendors

Table 5 shows street beverage handling behavior and socio-economic characteristics of hot beverage street vendors. Almost half street vendors were mobile (51.3%) or in street corner (13.3%) where people are pass-by or gathered near market (14.7%) or at car station or bus terminals (16.0%) where people are crowded. Some street vendors chose location near school or bus terminals. No vendors washed their hands before or after hot beverage preparation.

Most vendors interviewed were the owner of their hot beverages business (76.7%). This business allowed them to meet the needs of their family (72.0%). Almost all vendors (99.3%) were not organized in association. Most of them (75.3%) paid their taxes (Table 5).

Table 3. Number of hot beverage cup per day drunk by vendors

Beverages Number of beverage cup per day	Coffee (%)	Tea (%)	Milk (%)	Cocoa powder (%)	Milk with coffee (%)	Total (%)
Vendors not consumers						12(8%)
1 cup	16 (72.7)	2 (9.1)	1 (4.5)	3 (13.6)	0 (0.0)	22 (14.7)
2 cups	23 (29.9)	37 (48.1)	15 (19.5)	0 (0.0)	2 (2.6)	77 (51.3)
3 cups	15 (48.4)	9 (29.0)	6 (19.4)	1 (3.2)	0(0.0)	31 (20.7)
4 cups	5 (83.3)	1 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	6 (4.0)
5 cups	2 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.3)
> 6 cups	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	61 (44.2)	49 (35.5)	22 (15.9)	4 (2.9)	2 (1.4)	(100)

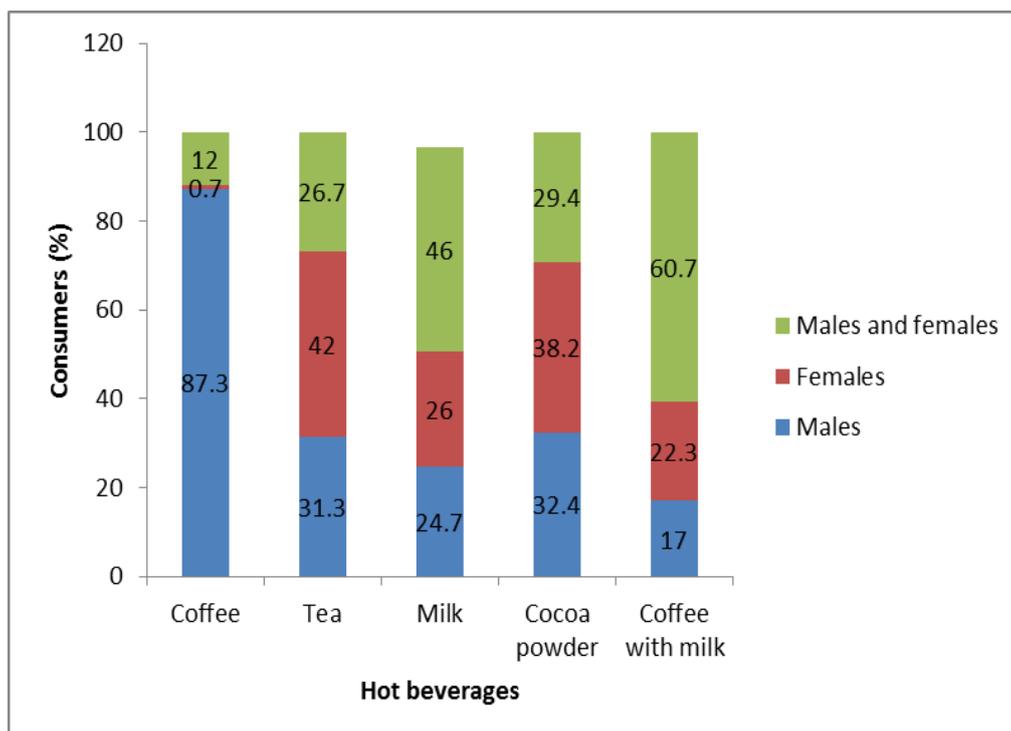


Figure 4. Hot beverage preferred by sex of consumers according to vendors

Table 4. Consumer's age groups according to vendors

Hot beverages Age groups	Coffee (%)	Tea (%)	Milk (%)	Coffee with milk (%)	Cocoa powder (%)
Children	0	0	8 (5.3)	8 (5.3)	13 (8.7)
Young people	93 (62.0)	34 (22.7)	21 (14.0)	13 (8.7)	2 (1.3)
Adult	14 (9.3)	37 (24.7)	3 (2)	7 (4.7)	0
All ages	21 (14.0)	54 (36)	93 (62.0)	60 (40.0)	7 (4.7)
Young and adult	22 (14.7)	25 (16.7)	1 (0.7)	2 (1.3)	1 (0.7)
Children and young people	0	0	18 (12.0)	10 (6.7)	11 (7.3)

Table 5. Street hot beverage handling behavior and socio-economic characteristics of vendors

Question items	Practice or response n (%)	
	Yes	No
Hot beverage mobile cart location		
1. Street corner or street crossroads	20 (13.3)	0 (0)
2. Near market	22 (14.7)	0 (0)
3. Near car station or bus terminals	24 (16.0)	0 (0)
4. Near school	5 (3.3)	0 (0)
5. Mobile vendor in street	77 (51.3)	0 (0)
6. Other	2 (1.3)	0 (0)
Vendor hygiene		
1. Vendors washed their hands before or after handling, preparing or serving hot beverages to consumers	0 (0.0)	150 (100)
2. Vendors clothes were clean and presentable	96 (64.0)	54 (36.0)
3. Vendors handled cup with bare hand	0 (0.0)	150 (100)
Socio-economic characteristics		
1. Owner of your hot beverage business	115 (76.7)	35 (23.3)
2. Sale allow you to meet the needs of your family	108 (72.0)	42 (28.0)
3. Organization in association	1 (0.7)	149 (99.3)
4. Payment of taxes to the Town Hall	113 (75.3)	37 (24.7)

4. Discussion

For [27], foods and beverages which are prepared and sold by the sellers on places like streets, market, festival areas and consumed by the consumers on the run are known as street food. Street foods especially show the eating habits of people living in big cities such as Abidjan.

Survey results showed that, majority of hot beverage street vendors were foreigners (88.0%) and illiterate (71.3%). The reference [28] reported that preparing and selling food on the streets provide a constant income for millions of uneducated people. Regarding the employment, street food provides a good job opportunity and income for sellers with small capitals and especially for women [29]. The reference [30] found out that among 225 street sellers in Uganda, 87.6% were made up of women with low education that they were using non-recyclable plates and glasses during food sale, and that soap and cold water were widely used in cleaning of kitchen materials. Also, [5] showed that vendors' knowledge is poor and had lower education levels, which is also reflected in their largely inadequate facilities and unhygienic behavior while selling food.

In our study, hot beverage preparation methods of street vendors have been described in Figure 1 and 2. In another study, it was seen that 95% of street food processors did not have sufficient information and that 88% applied

wrong food safety methods [31]. Besides, it was determined in several studies that food sellers did not have adequate information regarding pathogens [32]. Reference [33] determined that usage of poor quality raw materials, inefficient audits, insufficient infrastructure at places where street food is sold, and insufficient sanitation knowledge among street food sellers all form risks for food safety. Urbanization and increase in population spreading in many countries in recent years are influential in the development of street food as an illegal sector [34,35]. Food contamination can occur during the steps related with production, processing, and preparation for consumption. It is determined that in many countries national authorities have prepared legislations to reduce contamination during food production and processing stages. Besides, specific legal regulations were not determined for people selling these products [34,36].

The survey revealed that street vendors preferred coffee (40.7%) than tea (33.3%). For them, coffee offers an energy boost and beneficial plant compounds. For [21], coffee is a complex beverage with hundreds of bioactive components with potential adverse or beneficial effects on the cardiovascular system. The most abundant bioactive compounds in coffee are caffeine, and polyphenols. Reference [14] reported that people drink coffee to relax and enjoy its diverse flavors and aromas. It has physiological and psychological effects beyond its

nutritional benefits [14]. Improvements in mental alertness, concentration, fatigue, and athletic performance are well documented benefits [37,38]. Caffeine is a psychoactive stimulant known to increase alertness, elevate mood and give temporary energy boost thereby easing fatigue [39]. Caffeine is also consumed widely for its stimulatory effects of enhancing wakefulness, mood, physical endurance and mental concentration, and decreasing the sensation of fatigue [40,41].

The result from Table 5 shows that, street vendors with coffee carts liked to sell hot beverages to passers-by in street corner, where active population work (market or car station). Some street vendors chose location near school or bus terminals. For [27], in today's world, people prefer to buy food sold on the streets to meet their nutrition needs outside home. Street foods are being prepared and sold at places like streets, near schools, train or car stations, bus terminals, entertainment and festival areas where people are crowded. Street food is preferred by consumers, especially students, because of its delicious taste, accessibility, variety, and cheapness [42].

Before hot beverage preparation, vendors must wash their hands with clean water. Unlike, no vendors washed their hands before or after beverage preparation. According to [5], before each operation, the food preparer must wash their hands with clean water, however, more than half of the operators washed their hands in their studies.

Temperature measurements of hot beverages and hot water used stored in thermos to prepare these beverages were taken in order to assess beverage safety because of the variability of preparation methods. For [43], it is important to prepare teas and coffees using the correct method for the drink ordered by the customer. Many people can choose between coffee and tea, and drink these in varying ratios depending on taste preference, lifestyle, socio-economic factors, genetics and health [44].

According to vendors, consumers liked drinking tea (42.7%), followed by coffee (38.7%). Reference [13] reported that tea is the most widely consumed beverage in the world with an estimated daily consumption of 15-20 billions cups. This is due to its refreshing, mild stimulant properties, and also to its medicinal and general health-promoting purposes. Coffee and tea are both drunk in most countries, usually one predominates because of economic (e.g., trade and income), marketing, cultural and ethnic reasons [45]. Many people can choose between coffee and tea, and drink these in varying ratios depending on taste preference, lifestyle, socio-economic factors, genetics and health, but in very few mortality studies associations with coffee and tea have been investigated simultaneously, and no studies have been conducted on possible effects associated with substituting one beverage for the other [44].

Most street vendors consumed only one cup of coffee per day (72.7%) and preferred twice a day (48.1%) for tea. Millions of people around the world depend on a morning cup of coffee to get their day started. The New Zealand Ministry of Health recommends consumption of no more than six cups of tea or instant coffee (or three "single" espresso-type coffees or one "double" espresso-type coffee) each day [46].

The result of socio-economic characteristics of vendors showed that, most vendors interviewed were the owner of

their hot beverages business (76.7%) and this business allowed them to meet the needs of their family (72.0%). Therefore, street hot beverage trading is a profitable and a lucrative business venture in Côte d'Ivoire that is worth investing. For [47], the role of informal sector for any developing country is to reduce poverty and hunger from the country of overpopulation with lack of job opportunities. For some people informal sector is the only source of income hence now mere assumption that dynamic economic policies will drive informal sector out of the country is false. The awareness of vendors to food safety and food hygiene practices should applied to avoid possible disease or effects to consumers [47]. According to [6], lifestyle changes and socio-economic factors creates very little space for consumers to look at other alternatives one of which would be to prepare one's own meal. Therefore, street vendors should have direct access to potable water and have formal food safety training.

5. Conclusions

To our knowledge, this is the first hot beverage study to assess the characteristic of vendors with hand push mobile carts in Abidjan (Côte d'Ivoire). Street vendors preferred drinking coffee to boost of energy to sell. According to them, tea was the most beverages consumed by Ivoirians. The results from this street vendors showed that most street vendors are foreigners and illiterate. These street vendors therefore need training in basic hygiene practice to avoid risks such as food contamination or throwing plastic cups on the street.

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