

Food Sales Activities Associated to Family Survival Strategies During Covid-19 Lockdown in Brazzaville, Congo



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ABSTRACT: The COVID-19 pandemic has a negative impact on people's living conditions, particularly in sub-Saharan Africa in vulnerable and low-income families. The aim of this work is to analyze the socio-demographic profile of people who engaged in food sales activities during the COVID-19 lockdown in Brazzaville, as well as their coping and survival strategies. The study, which used a mixed (qualitative and quantitative) approach, included 716 people (241 men and 475 women) aged 18 to 72 years residing in four communes in the southern zone of Brazzaville,

Republic of Congo. The main study inclusion criterion was the practice of selling food during COVID-19 lockdown. However, we did not include people whose profession had been selling these products prior to the health crisis. The qualitative data collected during the interviews concerned information on vendors, sales locations, coping strategies used to find the products sold, and sales prices. As for the qualitative data assessed using a food questionnaire, they were summarized in terms of the quality and quantity of food consumed, which made it possible to assess daily energy intake and therefore the level of food security. The results showed that the sellers, with an average age of 42.7, had a relatively low level of education and lived in a medium-sized family (8). Of these, 21.8% were food insecure. Foodstuffs sold were dominated by miscellaneous products (48.2%), street foods (26.7%), ready-made meals (22.3%), cassava flour (17.4%) and fruit and vegetables (7.5%). Salted fish, smoked fish and frozen (imported) meat products were also sold. As far as prepared dishes were concerned, grilled meats of various kinds were the most popular. Sales outlets included state markets, neighborhood markets, storefronts and street markets for auctions. The use of rickshaws and wheelbarrows by a few money-seeking youngsters enabled the products purchased to be transported from the places of purchase to the various markets or sales sites. In short, given the absence of an effective distribution and marketing policy in the food system in times of crisis in the Congo, our results call into question the resilience of vulnerable populations in the face of the country's sociosanitary crises.

KEYWORDS: COVID-19, adaptation strategies, food sales, food security, Brazzaville

INTRODUCTION

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic has become a major global pandemic following its outbreak in Wuhan (China) in December 2019. A pandemic declared a public health emergency of international concern by the World Health Organization (WHO) on January 30, 2020, the virus has reached every continent with high virulence in Europe and America, affecting almost every country on the planet. In Africa, the pandemic has not had the same impact, with the exception of South Africa, Morocco and Egypt. The Republic of Congo-Brazzaville has not remained on the sidelines: from March 14, 2020, when the Congolese government confirmed its first case of the COVID-19 coronavirus, to February 21, 2022, 3905 cases of COVID-19 have been diagnosed and confirmed, with a total of 378 deaths (case-fatality rate of 1.6%) (Ministry of Health and Population,

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2022). Faced with this health emergency with an asymmetric impact on the socio-economic situation, several essential protective measures were taken to combat the pandemic, including the declaration of a nationwide state of health emergency, coupled with the announcement of a general 20-day lockdown, followed by the publication of Decree N°2020-99 of April 1, 2020 listing essential goods and services and authorized essential travel. The populations of the country's two main cities, Brazzaville (political capital) and Pointe-Noire (economic capital and seaport on the Atlantic Ocean), the epicenters of the epidemic, were particularly concerned, as the first cases of COVID-19 were diagnosed there. The first lockdown of Brazzaville's population, by government decision, included: the opening of state markets (district or neighborhood) three days out of seven (Monday, Wednesday and Friday); a week-long ban on vehicles, motorized vehicles and bicycles; a ban on leaving the district of residence; the wearing of masks (medical or home-made); and the introduction of a curfew (from 8pm to 5am). The implementation of these measures, combined with the closure of interdepartmental and international borders, has had a major impact on the national economy and, above all, on the food and nutritional security of the population. Indeed, the restrictions on citizens' mobility during the lockdown phase, combined with the closure of many food stores, supermarkets, mini-markets, cafés and restaurants, exacerbated the impoverishment of low-income households, particularly those living from day to day on small trades, street trading and hawking. As with the impact of armed conflict on the lives of displaced or refugee populations in sub-Saharan Africa, the analysis of the impact of lockdown on food consumption and survival strategies of populations in the epidemiological cycle draws on the nutritional crisis and poverty. It is in this context that, during the period of lockdown, an emergence of the informal food sector was noted among confined populations in the various districts of Brazzaville, using marginal markets to replace the usual household distribution, supply and consumption circuits. Urban, peri-urban and even rural agricultural production supplying Brazzaville has been severely disrupted. Indeed, before the publication of the decree specifying essential goods, actors and services, urban and periurban market gardeners were already calling for a relaxation of lockdown measures, so that they could continue their activities to feed the population (Lossele and Atipo, 2020). With regard to imported food products (beef, pork, poultry, frozen sea fish, salted fish, wheat, sugar, rice, pasta, oil, salt, tomatoes and onions), the COVID-19 crisis revealed the fragility and heavy dependence of the Congolese food system (Bitsoumanou Nkounkou and Martin, 2021). Following the flooding of markets and panic buying observed a few days after the announcement of the lockdown measures, food consumption collapsed and underwent profound changes. An analysis of the food situation and living conditions therefore appeared to be an essential element in the epidemiological crisis situation. In view of these observations, the absence of strategies for monitoring and/or supporting the population's food supply by the Congolese authorities, and the limitations of a few fragmentary studies and reports on the impact of the COVID-19 pandemic on the Congolese food system (Bitsoumanou Nkounkou and Martin, 2021; Ngoma, 2020), we felt it necessary to understand the food survival strategies implemented by the inhabitants of Brazzaville during the COVID-19 lockdown period, in order to enable political and socio-health decision-makers to intervene with precision in times of crisis. To this end, our study was structured around the following questions: Who are the nonsalespeople by profession who engage in commercial activities in the food sector during the COVID-19 lockdown in the southern part of Brazzaville? What is the nature of these activities? This study therefore aims to: (i) identify the profile of people involved in food sales/production activities during the COVID-19 lockdown in Brazzaville, (ii) assess their level of food security; (iii) characterize these activities in the context of food survival strategies, and (4i) specify the reasons for selling food products during this period.

MATERIALS AND METHODS

Scope of the study

The study was carried out from March 10 to August 10, 2020 (COVID-19 lockdown period) in four of Brazzaville's ten communes: Madibou, Makélékélé, Baongo and Mfilou (Figure 1). The choice of the study area, located in the southern part of Brazzaville, is explained by the precarious living conditions of the population and/or the low income of the majority of families (CNSEE, 2018).

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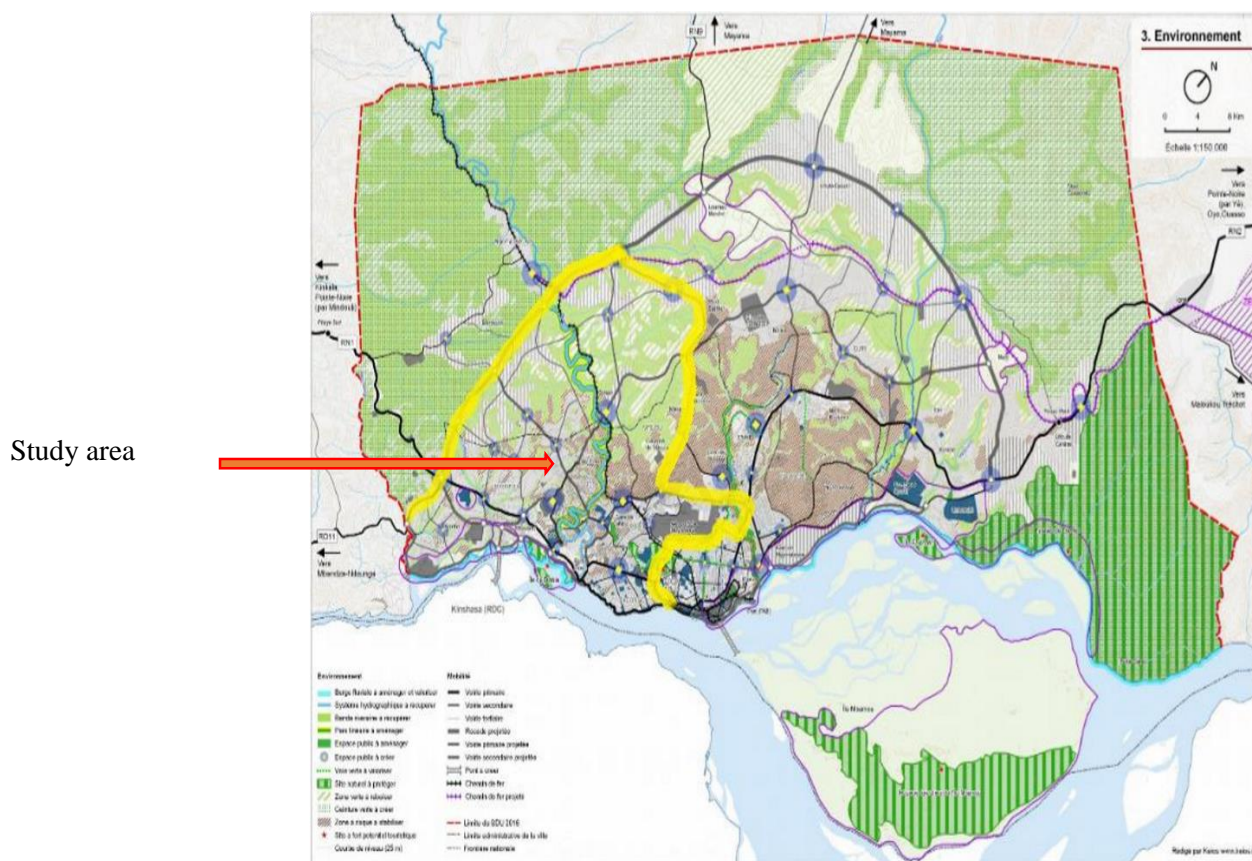


Figure 1: Location of the study area in the city of Brazzaville. (MCUVCV, 2016)

What's more, the recurrent armed conflicts of 1997-1999 in these four communes have further eroded families' standard of living, making it difficult for them to guarantee food security and even balance their daily food intake (Makosso Vheiyé et al., 2008). We know that in a context of advanced impoverishment, disadvantaged people develop multiple survival strategies. They make changes in the way they manage their domestic economy (Nganga et al., 2013).

Sample

A total of 6,000 families, from the Kongo ethnic group which is in the majority in these communes, made up the study population at the time of the survey (RGPH, 2014). These were subject to 2 random draws with 2 fractions of 1/3. Each commune is divided into neighborhoods, which are subdivided into blocks. For fins of representation, the selection of neighborhoods and blocks within the study area was based on a 1/3 draw for each entity. This procedure resulted in the selection of 108 blocks. From the families making up this population, the minimum 1/10 drawing method, a fraction accepted during national survey operations (Hambleton et al., 1995), enabled us to select 716 families, divided into 228 families in Makélékélé, 184 families in Bacongo, 163 families in Mfilou and 141 families in Madibou. The process also took into account the geographical location of the living areas (number of streets, superficie). As a result, one street in three was selected within the block monitored, and one plot in five within the same street (once on the left, once on the right). The effective population selected was that of people engaged in an informal activity associated with the sale of foodstuffs within the family during the period of lockdown. It was derived from the source population. Furthermore, if several individuals in the same family were engaged in such activities, only one of them was selected by random draw. In all cases, in two-parent families, the woman was selected; in single-parent families, it was either the mother or the father. The inclusion criteria for the study were: selling food products during the COVID-19 lockdown; being resident in Brazzaville for at least one year. The main exclusion criterion was to be a professional food seller. Voluntary consent to participate in the study was a prerequisite. A total of 716 individuals of both sexes met the inclusion criteria and thus constituted the study sample. The study was approved by the Comité National d'Ethique pour la Recherche en Sciences de la Santé (CNERSSA), an organ of the Délégation Générale de la Recherche Scientifique et Technique du Congo.

Methodological approach

This was a qualitative and quantitative study. The use of the qualitative approach, which was inspired by Lambert and Lambert (2012), aimed to answer the questions "Who", "What", "How" and "Where", on the practice of selling food products in Brazzaville

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during the COVID19 lockdown. The qualitative survey, which took place during the three opening days of the state markets (Monday, Wednesday and Friday) in the four selected communes, from 8 a.m. to 4 p.m., used individual interviews as a research tool. The semi-structured interview was conducted with people involved in food sales during the period of lockdown. It enabled us to gather information on the socio-demographic status of the vendors, the nature and characteristics of the food sales activities they were engaged in, and the reasons given for carrying out these activities.

The quantitative approach involved the administration of a questionnaire. The aim was to identify the vendor, but above all to determine the foods consumed that day, the most common modes of consumption and the quantities ingested (evaluated in glasses, spoons, cups, kitchen utensils, half-liter). This made it possible to quantify daily energy intake using the FAO's improved food table for use in Africa (FAO, 1970), and thus to assess the overall food security status of vendors during the COVID-19 lockdown period. A person was considered food-secure when his or her daily food consumption was greater than or equal to 2400Kcal (Devereux, 2006).

The questionnaire, which was drawn up in accordance with the rules for the construction of quantitative food questionnaires (Cubeau and Pequinot, 1976), was judged to be highly satisfactory, since 96% of respondents felt they had answered the questions asked truthfully. The majority of vendors were fixed to a sales outlet to carry out their activities, which favored their location and therefore facilitated the interviews. In the case of auction vendors, the surveys took place at the place where the interviewer purchased the food product. To facilitate data collection, appointments were made with sellers on a day of their choosing or during a period convenient to them. Those who were unable to complete the questionnaire were assisted by a member of the research team, which included the first author of this article and the other coauthors, all PhD holders (two in nutrition, one in development sociology, one in biostatistics, one in food toxicology and one in applied informatics).

Experimental procedure

The interview was coupled with in situ questionnaire completion. Selected subjects were invited to spend half an hour with the interviewer filling in the questionnaire in a semi-directive manner. If the subject's level of education did not allow for dialogue in French (the official language), national languages (Kituba and Lingala) and departmental languages (Lari, the local language widely spoken by these populations) were used for the interview.

However, Lari or Kituba, which is widely spoken in the study area, was used predominantly. The survey was carried out in two phases of 27 days each, between March 15 and August 7, 2020. The first phase, from March 15 to April 30, 2020, enabled the identification of sellers, as well as the modalities and reasons for carrying out sales activities. The second phase, from May 5 to August 5, 2020, was devoted to a quantitative study of the sellers' nutritional profile. In addition, subjects were made aware of the purpose and objectives of the survey, its scientific importance; anonymity and confidentiality were also guaranteed. During the surveys, the recommendations concerning physical distancing and the compulsory wearing of protective masks were respected.

Statistical analysis

Data entry and production of raw tables were carried out using Epi-Info version 6.1.0 and Stata®, version 10.0, followed by Excel for graphical illustrations. To process the data collected, the first step was to count the number of responses received. Secondly, we crossreferenced certain parameters that seemed relevant. Qualitative variables are expressed as figures and percentages, quantitative variables as mean (\bar{x}) \pm standard deviation (SD), sometimes accompanied by extreme values. The 2 means were compared using Student's t-test. The Chi-square statistical test (χ^2) was used to determine independence between the practice of income-generating activities associated with food and the various categorical variables. Odds ratios (ORs) between the levels of the various variables and the practice of said activities were calculated, along with their confidence intervals (CIs) using the logit method.

A multivariate logistic regression model was used to estimate the odds ratios adjusted for possible confounding effects between the variables studied. Egret software was used for logistic regression. The threshold for statistical significance was set at $p < 0.05$.

RESULTS

Socio-demographic profile of sales staff

Among the 716 vendors, there were 241 men (M) (33.6%) and 475 women (F) (66.4%). Table 1 reports the distribution of study participants according to family age, height, marital status and educational level.

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Table 1: Distribution of participants by age and household size

	Effective	Percentage
Age		
Under 30	91	12.7
30 to 39 years old	184	25.7
40 to 49 years old	268	37.4
50 to 59 years old	106	14.8
60 and over	67	9.4
Family size		
Less than 4 people	56	7.8
4 to 7 people	323	45.1
8 to 11 people	242	33.8
12 to 15 people	81	11.3
16 people and more	14	2.0
Civil status		
Single	57	8
Divorced	221	31
Married.	193	26.9
Separated.	214	29.9
Widowed.	29	4.2
Education level		
Primary	343	47.9
Secondary, 1st cycle	175	24.4
Secondary, 2nd cycle	86	12
University	14	1.9
Vocational school	66	9.2
Non-formal education	32	4.6

The average age of the respondents was 42.7 years, the youngest being 18 and the oldest 72. Sellers aged between 40 and 59 made up more than half the sample (52.2%); those who were not married were the most numerous (73.1%; $p < 0.02$). The level of education was relatively low, not exceeding junior high school (85.1%; $p < 0.001$). Average family size was around 8 members, with extremes of 2 and 18 members.

Food consumption and calorie intake

Food supplies were purchased at markets, most often and preferably in the morning, on working days during lockdown. For 63.3% of those surveyed, these were the major markets in each commune (Figure 1), for 10.1% of those surveyed, butcher's shops close to their homes, and for 7.2 % of those surveyed, auctioneers (Figure 2.)



Figure 1: Secondary market



Figure 2: Food sales at auctions

In addition to these places, there were neighborhood markets open in the afternoon, before dusk (5.4% of respondents), as well as front-of-house shops (4%) (Figures 3 and 4).



Figure 3: Hut front shops

With regard to meals, 29.0% of respondents ate just one meal a day, 55.5% two meals a day, and 15.5% three meals a day. In the latter case, the composition of the evening meal was not very varied for 72.4% of them. The data also revealed that 535 respondents (74.7%) did not eat a snack, and 654 (91.3%) did not eat lunch. The main foods consumed according to local recipes during lunch and dinner were: freshwater fish in broth; smoked fish mixed with salted fish, vegetables and dried shrimps cooked in water; smoked fish cooked in a broth made from peanut paste and *Gnetum africanum* (wild harvested leaves); braised pork skin ("poso" in Lingala, one of the national languages). During breakfast, 97.6% of subjects consumed bread, powdered milk (77.6%) compared to condensed milk (51.3%), meat saved the previous evening (52.9%), chickpea pulses (*Vigna unguiculata* or "Cao" in Congolese parlance) for 56.5% of subjects, raw fruit (carrots, cabbage, cucumber, tomato, avocado) or cooked fruit (green papaya with vinaigrette) for 27.5% of respondents. With regard to caloric intake, 21.8% of respondents (N=228), including 10.3% of women, were food insecure, with average individual energy intakes at the limit of norms: 2475 ± 394 Kcal/d. Although there was no difference between the four communes in terms of daily energy intake: 2507 ± 405 Kcal/d in Makélékélé versus 2531 ± 398 Kcal/d in Baongo versus 2492 ± 410 Kcal/d in Mfilou versus 2370 ± 361 Kcal/d in Madibou, the level of food security was lowest in Madibou (67.2%). The influence of family size on food security was highlighted: if the family size was greater than 8, food insecurity was characteristic of the member surveyed ($p < 0.05$).

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Household survival strategies

Table 2 reports on food sales activities in markets, storefronts and streets.

Table 2: Sales activities in markets, storefronts and streets

	Total (N)	Males n (%)	Females n (%)
Sale of ready-to-eat meals	163	28 (17.2)	132 (82.8)***
Small produce stall	342	147 (43.0)	195 (57.0)*
Street food	191	74 (38.7)	117 (61.3)*
Sale of cassava flour	125	7 (5.6)	118 (94.4)***
Sale of fruit and vegetables	54	3 (5.5)	51 (94.5)***

*, significant intersex difference at $p < 0.05$; ***, significant intersex difference at $p < 0.001$

Women predominated in all food sales activities carried out by our respondents during the COVID-19 lockdown.

Selling food in the street, in front of the hut or by auction was the primary survival strategy of the respondents. It was the main source of income for 347 respondents (48.5%), including 251 women. Foods sold included bread, peanuts, doughnuts and croquettes, and grilled meats (sea fish, top-quality beef and pork, chicken and turkey wings, chicken legs). However, local foods were also prominent (Figure 4), notably fried bananas and sweet potatoes (26.8%), followed by squash (19.5%).



Figure 4: Display of local fruit and vegetables

The sale of baked cassava bread was carried out exclusively by women ($n=86/475$; 18%). The other lucrative agri-food activities practiced during lockdown, shown in figure 5, concerned 172 respondents (36.7%), and four types were identified. Firstly, 43 respondents (9.1%), including 21 women, were engaged in market gardening. Secondly, there were those involved in agro-resource processing, with 56 cases, including 44 women. The fruits used for making/processing fruit juices were sorrel (*Hibiscus sabdarifa*), a juice known in the local language as *bissap*; ginger for a fruit juice known in the local language as *tangawiss*; and passion fruit or *barbadine*. The use of colorants has also made it possible to sell colored drinks.

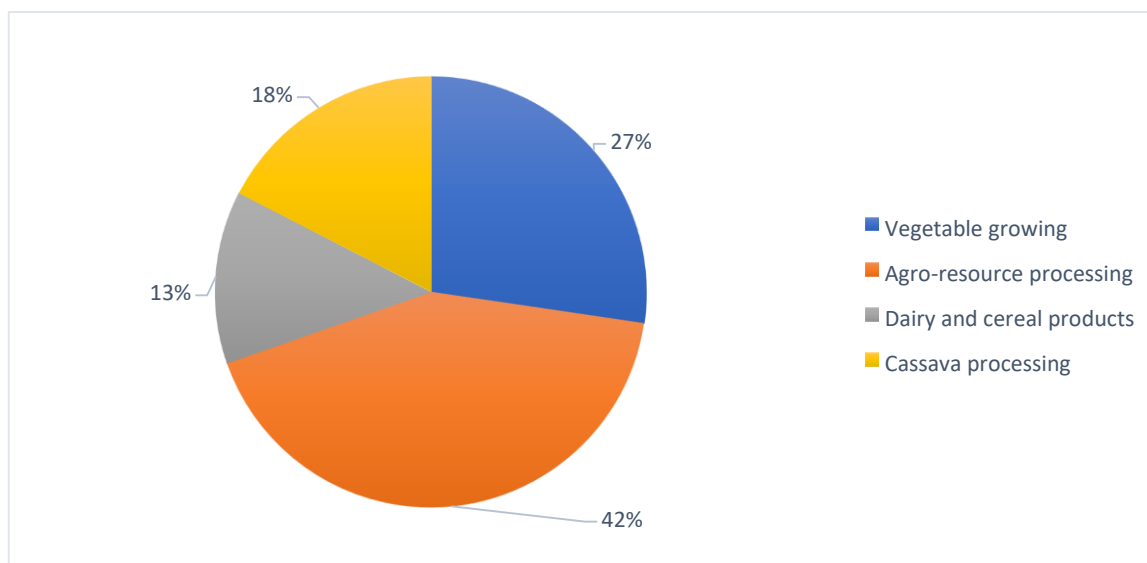


Figure 5: Frequency of other commercial activities associated with street food and auctions

Thirdly, the low price of dairy products (powdered milk) and cereals (maize) led 31 respondents (4.3%), all women, to make yoghurt (sold in 50 ml bags) and popcorn respectively. Finally, 42 women were involved in transforming rolled cassava dough into chikwangue (cassava bread). The remaining 111 respondents also engaged in other types of commercial activity, both in secondary markets and in front of huts. The first category was represented by the sale of food products on small wooden stalls or on the ground, carried out by 82 respondents (8.7%) (Figure 6).



Figure 6: Selling food on small wooden stalls

Products often found were canned goods (sardines, beef, pork), pasta, dried beans, cereals (rice, soya), peanut oil, palm oil, confectionery, packets of cookies and chocolate. Finally, the marketing of meals prepared at home and made available to customers occupied the last position (29 quotations; 4%). This activity concerned more women (n=22) than men (n=7). Among these 22 women, 17 (2.4%) mentioned the sale of cooked bushmeat dishes, notably civet (*Civettictis civetta*), dogfish (*russettus angolensis*), python (*Python sebae*) and Atherurus (*Atherurus africanus*). This activity took place in houses set up as "clandestine" restaurants, during the period when hunting was closed nationwide.

The adjusted logistic regression model indicated that the significant effect of age held when controlled for gender and type of activity practiced, except for those under 40. Also, the association between gender and lucrative food survival strategies remained significant. Similarly, the existence of a fixed family income had a significant effect. However, this effect was within normal limits when the subject involved was a woman (OR=1.18; CI: 1.00 - 2.19).

Multi-variate analyses are presented in Table 3.

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Table 3: Adjusted odds ratios (OR*) for food-related income-generating activities

Variables	OR*	IC (95%)	p
Gender			
Male	2.31	1.35 – 3.48	0.006
Female	1.32	0.81 – 2.16	<0.05
Age			
<under 40	0.90	0.40 – 2.21	NS
40-60 years	8.25	4.43 – 15.20	<0.001
>60 years	24.92	5.17 – 121.96	<0.001
Existence of a fixed income within a family	5.73	3.74 – 8.82	<0.001

Finally, the main reasons for choosing to sell food as a survival strategy during COVID-19 lockdown are given in Table 4. Nearly a third of the vendors surveyed (35%) explained that they sold food for reasons linked to difficulties encountered in daily life (rent payments, family maintenance, tontine contributions), while 129 respondents (18%) did so to contribute to the family income. The restrictive context of measures associated with the fight against the COVID-19 pandemic was mentioned by only 13.5% of respondents.

Table 4: Main reasons for choosing food sales activities

	Effective	Percentage (%)
Encouraged by another	57	8.0
Own initiative	31	4.3
Hardship and survival	251	35.0
Contribution to family income	129	18.0
Other source of income	101	14.1
COVID-19 context	97	13.5
Few or no alternatives	50	7.1
Total	716	100

DISCUSSION

The aim of this study was to characterize the food selling activities adopted by the populations of the southern arrondissements of Brazzaville as a means of survival during the COVID-19 lockdown.

Socio-demographic profile of respondents

Our data revealed more women (n=475; 66.4%) than men (n=241; 33.6%) among the respondents, with an M/F ratio equal to 0.5 (p<0.05). This observation is in line with other studies carried out in sub-Saharan Africa. For example, Resnick (2020) in Nigeria reports more women than men in the food sales sector, an observation also made by Oloko and Ekpo (2021) in the same country during the COVID-19 pandemic. This over-representation of women can be explained by the role of women in Congolese society, as elsewhere in Black Africa, in supplying the family or household in times of crisis (Osman, 2009), particularly during the COVID-19 lockdown, as shown by Matanga and Mukurazhizha (2023) in Zimbabwe.

The "stay at home" instructions during the lockdown had a negative effect on economic conditions and altered people's mental health (Hamadani et al., 2020), which later led to exacerbated the risk of food insecurity and domestic violence in households. The latter point is underlined by one of Matanga and Mukurazhizha's surveys (2020): "My husband is always at home because of the restrictions, he doesn't provide food for the family at all, but he expects to take all the meals. If I don't manage to provide him with food, he beats me" (p.6).

Under these conditions, women are more involved in playing an important role in ensuring the family's food security, a fact reported by several studies (Pongponrat and Ishii, 2018; Ruszczyk et al., 2020; Thibault and Van Wijngarden-Cremers, 2020; Tierney, 2019; Towo, 2020). This is in line with the words of a respondent in the study by Matanga and Mukurazhizha (2020): "We

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hear about different ways of making money, like making palm oil... (...)..., because we don't go to our weekly meetings, we don't know how to provide for our families, we can't earn a living by staying at home" (p.5).

To this end, women food vendors in major African cities were key players in the food system during the COVID-19 lockdown, as Adegbenle (2021) also reports from Nigeria. This trade therefore constituted an income-generating activity. Two other reasons that may explain the greater number of women vendors are the deterioration of public services and the decline in individual and family incomes. Faced with these problems, women find themselves trapped in food insecurity, and to escape the grip of poverty, they struggle in the rapidly expanding informal food-selling sector. In many Black African countries, but also in South America and Southeast Asia, with the exception of those where social norms prevent women from working outside the home, such as countries with a strong Islamic religious tradition (Cocheux, 2022; Valensi, 2004), women are in the majority among these vendors (Muzvidziwa, 2000).

In terms of age, the number of salespeople aged 18 to 49 increased from 91 (12.7%) to 268 (37.4%), followed by a decrease: n=106 (14.8%) in the 50-59 age bracket and n=67 (9.4%) in the 60-72 age bracket. The increase in numbers up to the age of 49 is clearly linked to the search for satisfaction of basic needs among young working adults during this period, during which independence, autonomy and the assumption of responsibility are of the utmost importance (Causat, 1995; Luyckx et al., 2008; Ryan and Deci, 2018).

Our data, which constitute indicators of young adults' participation in the informal food-selling sector, particularly street food in Congo, concur with those obtained by Oloko and Ekpo (2021) in Nigeria, with proportions nonetheless higher for the 18-30 age group (40.7%). In the smallscale street food trade, the proportion reported in the literature averages 31.7% in black Africa in this age bracket (Economic Commission for Africa, 2020). However, this rate is likely to be higher nowadays following the economic crisis affecting all countries on the continent, aggravated by the COVID-19 pandemic, as highlighted by the report of the ninth Council of the African Regional Forum on Sustainable Development (UN, 2023), as well as the study by HOUNGBEDJI and ZUNOSO (2021).

In our study, the average family size is around 8 people, which is in line with what might be expected. Indeed, this figure is based on the African concept of the family, which is not limited to the nuclear family (Gruenais, 1981). Although 80% of the respondents are single, separated or divorced, they often house members of their immediate and extended family, so they need income to cope with the constraints of COVID-19 lockdown.

Our results revealed minimal food security among the respondents, with average energy intakes ($2475 \pm 394\text{kcal}$) at the lower limit of normal. However, this level is slightly higher than the national average, estimated at 2393Kcal (MSP, 2022). This indicates the precariousness of living conditions, reflected in the absence of a national policy on food security as highlighted by several studies (Guina et al., 2021; Agejoh and Njieassan, 2022; Rudin-Rush et al., 2022) but above all by the reports of the thirty-second session of the FAO Regional Conference in 2022 held in Malabo (Equatorial Guinea) and the African Union (AU, 2020). This shows that a fifth of Brazzaville households are food insecure, a proportion similar to our own (21.8%). It can therefore be said that the COVID-19 lockdown has accentuated the pre-existing problem of food insecurity, a fact already noted by Makosso-Vheiyé et al. (2008) in one of the communes studied (Baongo) following the socio-political and armed conflicts of 1998-2002 experienced by the inhabitants of the said commune. All the above therefore follows a logic of actions described by Rwafa-Ponela et al. (2022), as illustrated in figure 7.

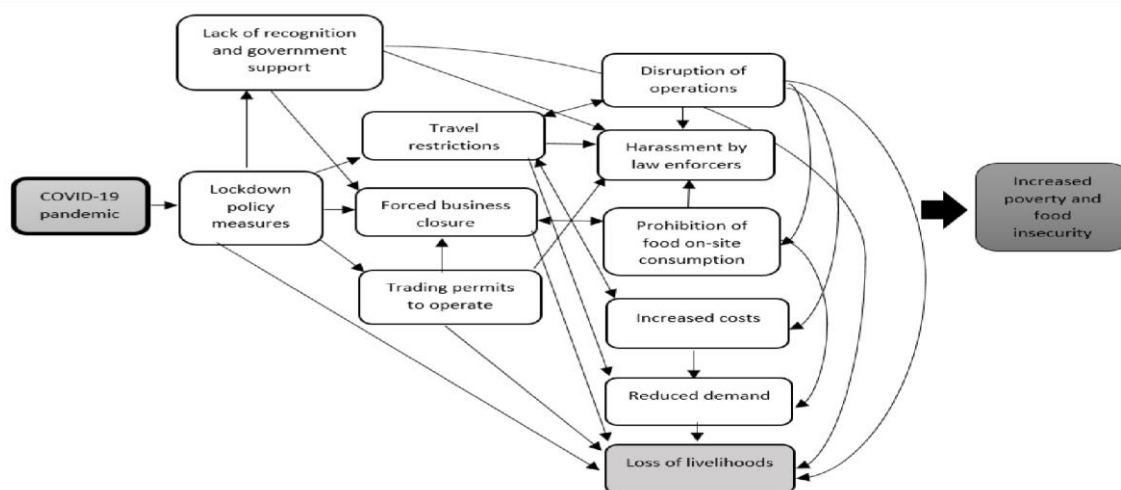


Figure 7: Effects of Covid-19 on the urban informal system that has threatened food security in Congo. Adaptée de Rwafa-Ponela et al. (2022).

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Thus, the 21.8% of interviewees in a situation of temporary food insecurity is the result of a combination of factors such as: the socio-political and armed conflicts of 1988-2002; the rise in food prices, fuel prices and, more generally, imported food prices, linked to the war in Ukraine or associated with poor road conditions; structural factors. These factors make people more vulnerable to the restrictive social and health measures associated with the fight against the COVID-19 pandemic, especially as they destabilize local livelihoods. Moreover, the influence of household size on food insecurity found in this work has already been reported by other authors in times of crisis (Kississou et al., 2013; N'Da, 2014), notably in the Democratic Republic of Congo (Kalonda et al., 2022; Mushagalusa, 2020) and Mali (Adjognon et al., 2021).

Respondents' adaptation and resilience strategies

With regard to the adaptability and food sales strategies adopted by vendors, our results show once again, as elsewhere in Black Africa, that the food market is an important driver of agricultural and agri-food development (Cour, 2004). In many countries, this market reaches or exceeds export markets in value. COVID-19 lockdown has therefore been the source of income-generating jobs to keep demand solvent.

Activities linked to the sale of market garden produce (tomatoes, cabbage, peppers, chives, spinach, carrots, chillies, celery, etc.) occupy the last position in this work. The vegetables (especially leafy greens) and fruit sold came from the market gardens of the four Brazzaville communes included in the study, located along the right bank of the Congo River and the watercourses that irrigate the city, but also from plantations in the Pool department, an agropastoral department, not forgetting the home gardens scattered throughout the neighborhoods. These include cassava leaves, highly prized by the population, chickpeas, taro leaves and shower potato leaves (*Ipomoea batatas*, or *matembele* in the local language). It should be remembered that the period of lockdown coincided with the second rainy season in Brazzaville and the surrounding area, which did not favor the production of leafy vegetables, tomatoes, cabbage, eggplants, green beans, lettuce, etc., by market gardeners, resulting in high purchase prices and thus justifying the low number of sellers of these products.

Supplies were made early in the morning (6am-7am) at the terminus of transport buses from market garden sites and villages in the Pool department. In addition to these foods, palm oil and its derivatives were produced in Congo.

Imported foodstuffs came mainly from Europe, Kinshasa (Democratic Republic of Congo), Cameroon and Côte d'Ivoire. These included pasta, cans of tomato, various canned foods (pork pâté, beef pâté, green beans, white beans, etc.), various cans of sardines, seasoning products for prepared foods (peppers, black pepper, celery, parsley, etc.), sachet milk powder, rice, beans, chickpeas, onions and garlic, and various cookies. All these products were sold individually, with prices ranging from 25 CFA francs to 5,000 CFA francs. In most cases, foodstuffs were sold on wooden stalls, although the use of sacks on the ground, on which foodstuffs were placed, was also common. Sales areas in state-owned markets were rented temporarily from the market committee, a body set up by the commune. The daily rental fee for the sales site was set at 100 CFA francs for a surface area of 1m x 0.5m during the period of lockdown. No tax was charged for sales taking place in the neighborhood markets set up for the occasion, in front of the huts (plots) or at the auction.

As for the ready-made dishes sold, they were often composed as follows: salted fish / *gnetum africanum* (mfumbu in the local Lari language) / peanut paste, smoked fish / *gnetum africanum* / peanut paste, smoked fish broth (and/or salted fish) with eggplant, braised turkey wings, braised chicken thighs, braised pork chops, braised turkey wings, braised gizzard skewers, braised kidney skewers. The quantity of the dish offered is in line with the amount of money available to the buyer: half a dish at 500 CFA francs with two pieces of cassava or fufou (cooked cassava flour), a dish at 1000 CFA francs, a tablespoon of vegetable at 200 CFA francs, half a chicken leg at 500 CFA francs, a gizzard skewer at 500 CFA francs, a beef kidney skewer at 200 CFA francs. The predominance of women among salespeople in the ready-cooked meals sector can be explained by the low level of qualification and/or education of the women surveyed. Indeed, this independent activity does not require much investment in human, material or financial resources. For all of them, selling food is seen as an extension of the female role of providing care to others (Almeida et al., 2020; Hudson-Weems, 1993).

We also noted the availability of bushmeat among the dishes prepared and sold by our saleswomen. This testifies to the continuation of hunting activities in the departments neighbouring Brazzaville during this period when hunting was closed, endangering natural species as hunting resources are fragile and exhaustible.

However, in the midst of the COVID-19 pandemic crisis, the sale of ready-made meals, especially meats, as well as yoghurts and other milk derivatives, and even leafy vegetables, is likely to be contaminated by animal or human faeces. Indeed, even though these foods provide the proteins and micronutrients needed to guarantee the body's immune defense, and are less expensive than those from formal markets, in the midst of the pandemic crisis the consumption of these foods could constitute a risk to human health, due to poor handling before cooking and exposure to the open air (Doungué et al., 2023).

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Study limitations and strengths

The results of this study should be treated with caution. The first is the lack of similar studies in black Africa to serve as a benchmark. In addition, the structures specializing in socioeconomic and demographic surveys in the Congo do not have databases for the population under consideration. In addition, the inclusion of economic variables (food purchase costs, family income, etc.) should enable a better discussion of the results obtained, as noted in other studies (Rogan and Skinner, 2017; WIEGO, 2020). These limitations do not, however, affect the power of our observations. Indeed, in an opinion survey, the quality of the information to be gathered depends on the respondent's credit and interest in the problem. Our data were therefore collected from a sample of people who had carried out an informal activity associated with the sale of foodstuffs. This survey was based on a random sampling process, based on voluntary participation. This approach is undoubtedly a source of bias in terms of selection, but in return it offers greater guarantees in terms of the accuracy of the data collected and the reliability of the responses, with the motivation of the people surveyed being of paramount importance. In any case, our study is the first of its kind in Central Africa to address this issue, and to include a representative sample.

CONCLUSION

Although the predominance of the female gender in this work may have introduced confounding factors, our study is the first to focus on food sales activities by non-professionals in this sector during the COVID-19 lockdown, a section of the Brazzaville population that experienced the lockdown in a situation marked by vulnerability. The results obtained show that, as elsewhere, families, in order to cope with the substantial drop in subsistence in their daily lives and to improve their ability to combat the aggressive phenomena associated with the pandemic, have carried out productive activities selling foodstuffs. These activities, which are usually minor commercial ventures, enabled them to cope with the lockdown under bearable conditions. Taking on the role of income-generator enabled our vendors to increase their selfreliance and improve their family's living conditions, especially for women. In the light of these results, it is clear that policies need to be implemented to support the disadvantaged fringe of the population during health crises such as that caused by the COVID-19 pandemic, in order to minimize food insecurity.

Conflicts of interest

The authors declare that they have no conflicts of interest in relation to this article.

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