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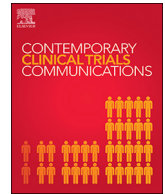
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## Recruitment of precarious families in an interventional study: Lessons from the French “Fruits and vegetables at home” (FLAM) trial

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### ABSTRACT

**Background:** The FLAM study was set up in order to assess the effectiveness of FV vouchers allowed to low-income households, on their FV consumption. The aim of the present study was to investigate issues associated with conducting interventional trials in disadvantaged populations using the FLAM study as an example of reaching target populations and recruitment difficulties.

**Methods:** Families were recruited in Saint-Denis city (North Paris suburb), via social and municipal structures. Main interest variables in the study (food consumptions) were collected using face-to-face food interviews, either at home or municipal facilities. A qualitative analysis was performed among people who refused to participate in order to understand the barriers to participation.

**Results:** A total of 95 parents-child pairs were included from May 2015 to May 2016. The families were mostly in precarious situation (63.3%), and most of parents were unemployed (71.3%). Almost the two third of children and 79.4% of parents were small consumers of FV (less than 3.5 servings per day). Several reasons for non-participation were reported including time constraints, understanding and mistrust issues.

**Conclusions:** Though using facilitating strategies, we recruited fewer participants than expected. The population finally included was mainly made of precarious families with a low consumption of FV. These results highlight the importance of identifying effective facilitating strategies to improve recruitment in disadvantaged populations.

**Trial registration:** ClinicalTrials.gov no. NCT02461238, on June 3, 2015, retrospectively registered.

## 1. Background

A consumption of at least 400 g of fruits and vegetables (FV) per day is recommended by the WHO and FAO, in order to prevent several chronic diseases including cardiovascular events, type 2 diabetes, obesity and cancer [1–5]. In France, this consumption is reached by 43% of adults of the general population [6], but a study performed in 2004–2005 among food aid users (the Food and nutritional status of

food aid recipients (ABENA) study) showed that only 7.3% of adults reached this guideline [7,8]. This is in line with several studies performed in other countries showing that FV consumption was decreased in people with a lower socioeconomic status [7,9–15]. This trend is also reflected in children, as those from lower income populations consume an average of 2.6–3.0 servings of FV per day, compared to 3.4 to 3.6 servings in children from the general population [16]. FV consumption is a marker of social health inequalities, since it has been shown to be

*List of abbreviations:* FLAM, Fruits and Vegetable at Home (*Fruits et légumes à la Maison*); FV, Fruits and Vegetables; PNNS, French National Nutrition Program (*Programme National Nutrition Santé*); CMS, Community health centres (*Centres Municipaux de Santé*)

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decreased in both adults and children from lower socioeconomic backgrounds [17,18]. Several programs and policies targeting disadvantaged populations have been developed in Europe and USA [13,19–21]. They usually rely upon both financial help (like vouchers exchangeable for FV) and nutritional education promoting healthier dietary behaviour and increased daily FV consumption. A review performed in 2013 by An and colleagues included 24 interventions promoting healthy food purchases [22]. Improved affordability was overall associated with significant increases in the purchase and consumption of healthier foods. But some limitations were currently highlighted including short intervention and follow-up duration and lack of overall diet assessment [22]. Difficulties in recruitment and follow-up of low-income populations and/or minorities in trials have been widely highlighted [23]. Despite number of researchers have investigated strategies to overcome recruitment and retention barriers of such population groups, interventional studies often struggle to be conclusive, given a lack of participants and/or follow-up duration [24–26]. Here we were interested in include a population not targeted before in France, that is disadvantaged families, but not (or not anymore) benefiting from food aid.

The «Fruits and Vegetables at home» study (*Fruits et légumes à la Maison*) (FLAM) primarily aimed at assessing the effect of vouchers on the daily consumption of FV in children from low-income families in a suburb area of Paris (France), over a one year period [27]. This paper focuses on the inclusion process. The main objective was to assess the effectiveness of the recruitment strategies, and investigate barriers to recruitment. Secondary objectives were to describe the included population regarding sociodemographic characteristics and dietary behaviours.

## 2. Methods

### 2.1. Study protocol

The study design of the whole FLAM study has been fully described elsewhere [27]. Briefly, FLAM is a randomized controlled trial assessing the effect of FV vouchers in low-income families over a one-year period, through a pre-test post-test design. In this first work, a mixed methodology was used. Collected data were described through usual quantitative methods, and this analysis was completed by a qualitative survey aiming to understand the reasons for non-participation.

### 2.2. Inclusion criteria

The target population was defined as follows: families with at least one child aged from 3 to 10 years old, living in the northern districts of Saint Denis. Saint-Denis city (Seine-Saint-Denis county, Ile-de-France region, France), has been chosen as a representative disadvantaged location. Unemployment rate is high (17.5% of unemployed in 2014 vs. 10.4% in France) [28], as well as the poverty rate (38.7% vs 14.1% in France) [28–31]. In addition, the prevalence of diabetes for all ages was 5.42% in Seine-Saint-Denis (while it is 4.82% in France) [32], and the obesity rate was 13.9% in children aged 5 years old against 10.6% in France [33]. Single parenthood was initially a selection criterion, but given recruitment difficulties (see below), inclusions were then extended to families with two parents. In addition participants had to have incomes below the poverty line, or be beneficiaries of social minima (Active Solidarity Income, Allocation of minimum pension), unemployment, and/or beneficiaries of any income-terms allowance. The poverty line threshold was defined using the French National Statistical Institute (INSEE) according to the French incomes data [34]. The first threshold was set at 1.234€ per month rounded up to 1.300€ for a single-parent household with at least one child aged under 14 years old. For a couple with at least one child aged under 14 years old the threshold of 1.777€ per month was rounded to 2.000€. Finally, French language had to be well spoken and understood.

### 2.3. Recruitment strategies

The inclusion period was initially planned to start in May 2015 and to end in December 2015. According to previous published and validated recruitment strategies [25], the recruitment of participants was first performed based on referral from municipal services in the city of Saint-Denis, such as social workers, local associations and municipal health care centres. Families from the neighbourhood usually know and trust these structures. From January to July 2015, a wide communication campaign was provided through posters, flyers and information in several community centres and targeted neighbourhoods. Dedicated phone line, e-mail address and social network page were created at the early beginning of the study. Permanencies to present the study and try to recruit families were held during neighbourhood festivals from April to September 2015. We tried to proposed flexible schedules and adapt as much as possible the place of interviews to each participant. Thus, some interviews were held at home. Finally, a financial incentive through “cultural” vouchers worth 10 euros exchangeable for books, school supplies, toys or museum tickets, was offered for each completed questionnaire. Given the lack of participants despite all these measures, we decided to extend the recruitment period to May 2016 and to remove the single-parent criterion. Finally, two specific mailings were addressed to eligible participants: the first in November 2015 using available information from the Saint-Denis family allowances fund (sent to 1270 families), the second one in April 2016 using information from the family department of the Municipality of Saint-Denis (sent to 1184 families). Each contact we had with families interested in the study was listed, and we tried collect as much information as possible (i.e. mean of contact, sociodemographic characteristics). For clarity, results of the recruitment process in this paper are divided in 3 categories: families recruited following a spontaneous contact, or following a contact with one of the FLAM investigators or with a social worker of the neighbourhood.

### 2.4. Questionnaires and data collection

Data were collected via face-to-face questionnaires administered by trained interviewers, for about 1 h duration. Volunteer families were interviewed at community centres, or at home in order to sign the consent form, and complete the questionnaires. Children older than 5 years were directly interviewed, whereas food consumptions were estimated by the parent for younger children. Data on inclusion criteria and sociodemographic characteristics were first collected. Then, a food frequency questionnaire was used to describe the consumption of children and adults in 13 main food groups (as cereal products, starches, vegetables, fruits, legumes, dairy products, meats and eggs, fish and sea-food products, fast-food and pizza, salty snacks, sweet products, and beverages). This allowed assessing the frequency of their specific daily, weekly or monthly intakes (the portion sizes were not assessed). Participants were considered low consumer of FV when they reported eating less than 3.5 servings of FV per day [35]. This questionnaire were adapted from those used for the ABENA study, which were specifically designed to be administered to disadvantaged groups [8]. Finally, information on living conditions and financial difficulties was also collected. We relied upon the latter data and sociodemographic characteristics to compute the EPICES score [36]. Based on 11 questions on various socioeconomic determinants, this individual score assesses the precariousness level of subjects. It ranges from 0 (the less precarious situation) to 100 (the most precarious situation), with a threshold of 30.17 to define precariousness, a score upper than 53.84 reflecting a great precariousness. The random allocation whether in the intervention or control group were performed at the end of the questionnaire, using an algorithm of random distribution, which was computed to obtain balanced groups every 50 inclusions.

## 2.5. Qualitative analysis

The qualitative survey was conducted from March to September 2017. It was performed through semi-directive telephone interviews among people who refused to participate or did not show-up to inclusion meetings. Participants were recruited on a voluntary basis. The number of interviews was determined using the data saturation method, based on the assumption that the new collected data do not bring any new element to understand the phenomenon under study. The data were collected with audio recording before being transcribed and anonymized. All interviews were analysed through thematic content analysis. For each of them, a first intuitive reading, called "floating" reading, allowed the emergence of the main ideas of the speeches [37]. A second reading called "in-depth" was done, focusing on the meaning of the discourses [38]. The analysis identified on one hand units of meaning called "functional units", of varying sizes, and on the other hand the "nucleus of meaning" corresponding to the different units of meaning [39,40]. The results were therefore categorized into: headings/Subheadings – Themes – Sub-themes – Units of meaning. The categorization of the data was done using an inductive approach.

## 2.6. Ethics

Each adult participant (whether the mother or the father included with his/her child) signed a consent form, after the interviewer made sure it was well understood. The study was approved by the Ethics Review Committee of the National Institute of Health and Medical Research (*Institut National de la Santé et de la Recherche Médicale*) (Inserm) IRB00003888 under the number 15-247. The declaration to the National Commission of Data Processing and Liberties (*Commission Nationale de l'Informatique et des Libertés*) (CNIL) of February 26 2015 was made under number 1838429v0.

## 2.7. Statistical analyses

The sociodemographic characteristics were described using means and standard errors or proportions according to the qualitative or quantitative status of data. French dietary guidelines were used to define frequency categories of all food groups (for example 3.5 and 5 servings of FV per day) [35]. Consumption frequencies were then described using proportions.

### Sample size calculation

Sample size computation was based on the primary outcome of the study, i.e. the comparison of the proportion of low consumers of FV in children at the end of the study between the intervention and the control groups. It took into account a type I error of 5% and with an expected power of 90%. The baseline proportion of low consumers was expected to be the same as the ABENA study, 83.9% [8]. We hypothesized that at the end of the study, the proportion of low FV consumers in the intervention group would be equivalent to that of the French general population, i.e. 61.0%. (while this proportion would be unchanged in the control group) [6]. This led to an expected number of participants of 92 for each group, leading to a total of 184 participants. The percentage of people lost to follow-up was estimated to be about 40%, leading to an expected number of participants of 300. All statistical analyses were performed using SAS software (*version 9.4, SAS institute, Cary, NC, USA*) [41].

## 3. Results

### 3.1. Barriers to recruitment

Most of families (75%) have been included following a spontaneous contact (Fig. 1). The number of contacts, appointments and inclusions following the two mailing campaigns are summarized in Table 1.

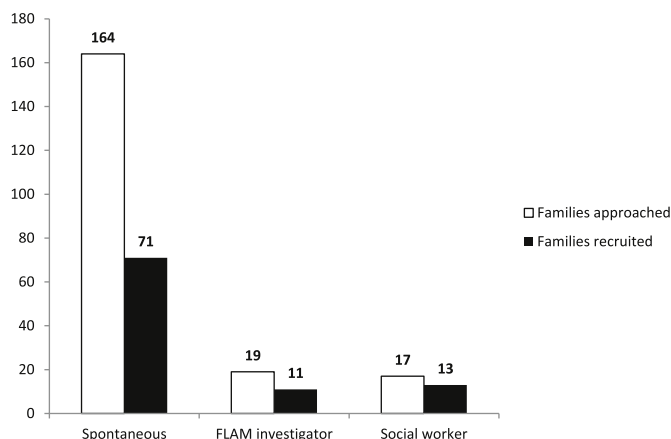


Fig. 1. Number of families recruited according to the mean of inclusion.

Table 1  
Rate of contacts, appointments and inclusion after the two mailing campaigns.

	Family allowances fund (Novembre 2015)		Municipality of Saint-Denis (April 2016)	
	N	%	N	%
Mails sent	1270		1184	
Calls following the mailing	86	6.8%	17	1.4%
Appointments	67	5.3%	13	1.1%
Inclusions in FLAM study	47	3.7%	3	0.3%

Finally, 50 families were included due to these mailings, representing 2.0% of the mails sent. Of the 24 families who contacted us after seeing a poster in their neighbourhood, only 5 were finally included.

### Results of the qualitative survey

Of the 73 people on the phone, 15 hung up as soon as the interviewers introduced themselves as part of the FLAM study, or just after the first question which was: "Can you remember if you called in order to participate to this program?" fruits and vegetables at home (FLAM)? ". The most logical reason to explain this first observation is that people who refused to participate to the study in the first place, also refuse answering questions related to it. The analysis finally included a 10 people (9 women and 1 man).

#### 1) Based on the collected information, we were able to identify 3 likely reasons for non-participation:

**A lack of time:** "I don't have the time to do these things ... meetings, all this"; "It's not appropriate for people who work ... How could I do?... I'm alone with my daughter, I don't have any time".

#### Mistrust from some people when they were solicited:

1/By analogy with advertising: "I think there are advertising stuffs too ... they tell us to eat fruits and vegetables every day just to make us consuming more"

2/Towards fruits and vegetables, and especially their potential toxicity: "Well ... I know that one must eat them [fruits and vegetable], but with all the things we hear about, I don't think it is such a good thing to eat them [fruits and vegetable] every day ... pesticides and so on ..."

3/Towards the study itself: "You know, people in this neighbourhood don't trust them ... especially when it comes from outside like that". Such formulation "from outside" refers to external entities

such as media, food industry, that cannot be trusted.

People or external bodies exerting a symbolic domination, such as researchers who carry out an investigation, or the media, or the industrial groups, or even the State, inspire mistrust and generate this distance. Besides, people of foreign origins are not always familiar with French cooking and traditional French dishes that are consumed by their own children at school canteen “*I don't know how to cook the vegetables here [from France] ... my children ask me for dishes they are used to have at the canteen, but I don't know how to do*”. In this case, a discrepancy between home life and French institutions represented by school and canteen is expressed.

**Comprehension/communication issues with the recruiters:** “*No one called me back, so I didn't participate*”; “*I was told that I was earning too much to participate*”; “*I'm married and when I called, they told me that it wasn't possible ... and we earn too much*”.

### 2) Several participants proposed solutions to facilitate the recruitment in such type of studies:

#### Improvement of the communication around the study by:

- Relying upon social networks: « My guess is that they should have increased advertising on social networks such as the Facebook page of the city ... »; “To encourage people to participate, one has to use the social networks ... the Facebook page of Saint-Denis”.
- Relying upon neighbourhood and community structures: “One has to rely on neighbourhood people to encourage people to participate ... That's what it is here, we're living as a community”

#### Facilitating participations through:

- Financial incentives (gift vouchers): “I think it's a good idea”; “It's always nice to receive a gift ...”; “Sure that I'd have appreciate it”.
- Offering cooking lessons: “... cooking lessons ... people do like that”; “One should have done such stuffs as seen on TV, you know ... cooking lessons to cook ancient vegetables”.

### 3.2. Characteristics of participants

From May 2015 to May 2016, 95 families have been included in the FLAM study (Fig. 2). A majority (92.6%) of families were single-parent

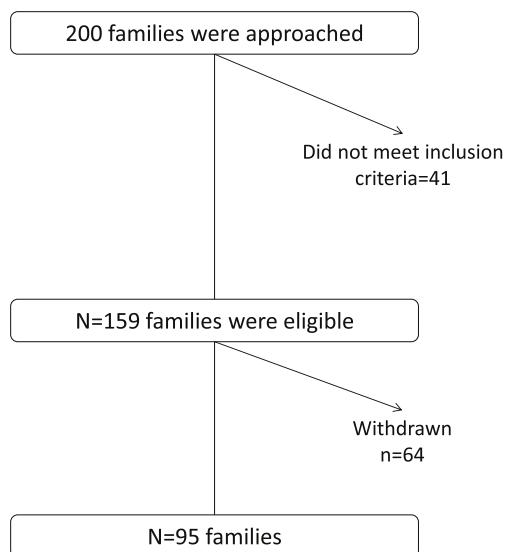


Fig. 2. Flowchart of the FLAM study (inclusion process was carried out from May 2015, 27th to May, 2016, 31st).

**Table 2**  
Sociodemographic characteristics at baseline ( $n = 95$ ).

	N	%
<b>Parental age (mean <math>\pm</math> SE)</b>	39.4 ( $\pm$ 7.3)	-
<b>Child age (mean <math>\pm</math> SE)</b>	7.5 ( $\pm$ 2.4)	-
<b>Marital status</b>		
Single	88	92.6
Cohabiting	7	7.4
<b>Number of individuals in the household</b>		
2	22	23.1
3	26	27.4
4	23	24.2
$\geq 5$	24	25.3
<b>Country of birth</b>		
France	31	32.6
including DOM-TOM	7	7.4
Sub-Saharan Africa	29	30.5
Maghreb	28	29.5
Other	7	7.4
<b>Highest qualification obtained</b>		
Primary school	29	30.5
Secondary school	35	36.8
High school	16	16.8
University	10	10.5
Other	5	5.3
<b>Professional status</b>		
Working	27	28.4
Unemployed	68	71.6
Unemployed, housewife	60	63.2
Student	2	2.1
Other unemployed <sup>a</sup>	6	6.4
<b>Household income (n = 94)</b>		
< 800€ per month	29	30.9
800–1300€ per month	55	58.5
> 1300€ per month	10	10.6
<b>EPICES score<sup>b</sup> (n = 90)</b>		
Precariousness <sup>c</sup>	86	95.6
Great precariousness <sup>d</sup>	57	63.3
<b>Health care insurance (n = 94)</b>		
None	12	12.8
CMUc	63	67.0
Private	19	20.2
<b>Perception of the financial situation of the household</b>		
« It's ok »	3	3.2
« I need to be very cautious »	33	34.7
« It's difficult »	34	35.8
« I often make debts »	25	26.3
<b>Have used food aid at least once over the past 12 months</b>	24	25.3

DOM-TOM: *département d'Outre-Mer et Territoires d'Outre-mer* i.e. French countries located outside Metropolitan France.

SE: Standard error.

EPICES: « *Evaluation de la Précarité et des Inégalités de santé dans les Centres d'Examens de Santé* »

<sup>a</sup> Unemployed for other reason: disability, sick leave ...

<sup>b</sup> Continuous score ranging from 0.00 to 100.00.

<sup>c</sup> Precariousness threshold is 30.17.

<sup>d</sup> Great precariousness threshold is 53,84.

(given to the initial inclusion criteria), and there was only one male among parents (Table 2). The mean age of children was 7.5 ( $\pm$  2.4) years, with a majority of girls (54.7%). Over half of families were from countries of sub-Saharan Africa and Maghreb. Most of parents were unemployed at the time of inclusion (71.6%), and almost a third (30.5%) of them had a primary school study level or below. In 63.3% of cases, EPICES score was upper than the great precariousness threshold, and more than a half of the sample reported a difficult financial situation, declaring “It's difficult” or even “I often make debts”. One

**Table 3**  
Food groups consumption according to the French Nutritional guidelines (PNNS).

	Children (n = 92)		Adults (n = 92)	
	N	%	N	%
<b>Fruits and vegetables</b>				
< 3.5 per day	59	64.1	72	78.3
3.5 to 5 per day	22	23.9	13	14.1
≥ 5 per day	11	12.0	7	7.6
<b>Bread and cereal products<sup>a</sup></b>				
< 3 per day	10	11.1	40	44.4
3 per day	24	26.7	14	1.6
> 3 per day	56	62.2	36	40.0
NR	2		2	
<b>Milk and dairy products</b>				
< 3 per day	33	35.9	76	83.5
3 à 4 per day/3 per day	45	48.9	12	13.2
> 4 per day	14	15.2	3	3.3
NR	–		1	
<b>Meat, fish and eggs</b>				
< 1 per day	12	13.3	15	16.5
1 to 2 per day	33	36.7	38	41.8
> 2 per day	45	50.0	38	41.8
NR	2		1	
<b>Fishery products</b>				
< 2 per week	55	61.1	56	60.9
≥ 2 per week	35	38.9	36	39.1
NR	2		–	
<b>Sugared products</b>				
Once a week or less	8	8.6	37	40.2
2–3 times a week	10	10.7	21	22.8
4–6 times a week	9	9.7	8	8.7
≥ once a day	65	71.0	26	28.3
<b>Sugared and fat products</b>				
Once a week or less	1	1.1	13	12.4
2–3 times a week	43	46.7	51	55.4
4–6 times a week	33	35.9	22	23.9
≥ once a day	15	16.3	6	6.5
<b>Sodas</b>				
< twice a week	33	37.9	45	51.1
2 times a week to less than once a day	32	36.8	23	26.1
≥ once a day	22	25.3	20	22.7
NR	4		4	

PNNS: *Programme national nutrition santé* NR: *no response*.

<sup>a</sup> Pulses are not included in this food group.

quarter of families reported having used food aid at least once during the past 12 months.

### 3.3. Food consumptions

Data on food consumption were available for 92 parent-child pairs (Table 3). According to the French Nutritional guidelines, 64.1% of children were small FV consumers (less than 3.5 servings per day), and 12.0% of them reported a FV consumption upper than 5 servings per day. A majority of adults (78.3%) were small consumers of FV, and only 7.6% of them reached the recommendation of 5 servings per day. A daily consumption of sugared products was shown in most children (71.0%), and more than a half (52.2%) of them ate fat and salty products at least 4 times a week.

## 4. Discussion

We faced difficulties to recruit volunteers in this study targeting a disadvantaged group of population. Descriptive results of our population at baseline showed that the included participants are matching with those targeted, that is, disadvantaged families, which do not currently match with food aid criteria. The proportion of low FV consumers was high in children, and even higher in adults.

Based on literature focusing on recruitment and retention strategies in trials performed among disadvantaged populations, a combination of several approaches such as face-to-face interaction, mass mailing, incentives, partnership with community actors, cultural targeting seem to show the greater results [23,25]. Despite using most of these strategies, using considerable means for communications around the study and removing the single-parent criterion during the recruitment phase, we included much less families (n = 92) than expected (n = 300). A statistical power calculation performed with 46 parent-child pairs per group leading to a statistical study power of 36.7% at the end of the study. The two personalized mailings we sent to the families led to very low response rates (6.8% and 1.4% respectively). Overall, compared to the number of families we approached, very few of them were finally included. Difficulties in recruitment and follow up are commonly seen in interventions studies involving low-income populations [21,42–44]. These are due to multiple causes including time and logistic constraints related to the study, or the fear of stigmatisation [23,45–47]. These barriers have also been studied from the sociological angle, and especially regarding the recruitment of individuals belonging to “hard-to-reach” groups in surveys which need reproducibility, and therefore a rigorous equality of each data processes. Sociologists highlight that such studies usually provide standardized procedures, which are barely efficient when applied to certain groups of population due to several factors such as: decreased availability, difficulties to understand the aims of the study and/or the data collection process, and the inaptitude at answering the questions (lack of language or reading or writing skills, mental disability, ...) [48–50]. Besides, methods aiming at “neutralizing” or “standardizing” the data collection process tend to neglect the fact that a survey situation is nothing else but a form of social interaction that necessarily implies different perceptions and practices from its actors [51]. Therefore, the survey situation can lead to what sociologists call a “symbolic violence” situation, in which rules, aims and data use are unilaterally imposed by the recruiters, without any possibility for the surveyed subject to completely understand or negotiate these rules [52].

When focusing on answers collected by qualitative interviewers, barriers usually described in such population are easily recovered, namely: mistrust and lack of comprehension (study was confused with an advertising process), a difficulty to understand and rank health-messages, and the lack of time and availability. Regarding mistrust and misunderstanding, we also assume that the random attribution of FV vouchers (instead of a free distribution for instance) could have widely contribute to it. It is also interesting to notice that, in this same analysis, the suggestions provided by several participants to facilitate the recruitment, are mostly strategies we implemented in this study, including financial incentive, information on the internet website of the city of Saint-Denis, cooking workshops, community relays etc ... Nevertheless, relying upon different centres and social workers of the city, allowed us to recruit a large diversity of participants. And our results shown that the highest rate of families recruited (compared to those approached) was found when in social workers recruitments. This strengthens how relying upon local structures is critical for this type of trials. It is however important to underlie that several community or social structures approached at the very beginning of the study refused to participate, considering the randomisation as an unequitable method.

A few studies focused on dietary habits of children from low-income families in France. Yet, there is a real interest promoting FV consumption and healthier diet among young children, since it has been shown that dietary habits in adults are widely determined by those adopted during childhood [53,54]. The FLAM study has been set in Saint-Denis city because of its greater precariousness and its increased cardiovascular diseases prevalence [28,32,33]. In 2013, according to the French National Statistic Institute (INSEE, *Institut National de la Statistique et des études économiques*), the poverty rate of Saint-Denis raised up to 36.7% of the population, and a quarter (25.4%) of families

were single-parent [29]. A systematic health check-up performed among 4 years-old children of the city showed that 12% of them were over weighted and 3.5% were obese [55]. The sociodemographic characteristics of the families show that we included the targeted population. First, the EPICES score shows that many families were in a great precarious situation, and the education level of parents overlaid those of families under the poverty line in France [56]. Our population shows several similarities with the ABENA 2 study. For instance, regarding the household financial situation, more than a half of families reported “having difficulties” or “often making debts”, like in ABENA 2 study. More, the sociodemographic characteristics of our population showed many similarities with those from ABENA 2 [57]. However, only a quarter of families reported having used food aid in the past 12 months prior to the interview, suggesting that we did recruit the population we targeted.

Surprisingly, the proportion of children low FV consumers (less than 3.5 servings per day) in our study was only slightly upper than those assessed in children from the general population (64.1% vs 58.3%) [6]. This could partly be due to the use of the food frequency questionnaire, which tends to overestimate FV intakes [58].

Less than 10% (7.6%) of parents met the French guidelines for FV consumption, and almost 80% were low FV consumers. These consumption levels are far below those found in the general population [6], and in line with those from ABENA 2 study and from a previous study performed in the same area in 2012 where almost 70% of subjects reported eating 2 servings or less of FV per day [21,57]. In a study assessing the impact of the “Healthy start” program in the U.K., only 2.4% of the pregnant women and 11.5% of those in postpartum met the recommendation of 5 servings per day, before the intervention (FV vouchers attribution) [59]. The discrepancies we found between children and parents consumptions could partly be explained by the meals proposed to children at the school canteen. Indeed, several recommendations aiming at improving the nutritional quality of meals proposed in school canteens have been settled in recent years. These include a wide offer in FV, allowing adequate intakes in fibres and vitamins [60–62]. However, several studies have shown that parents FV consumption could positively impact those of children, and vice versa [63]. An evaluation of the “5 a day” program in Los Angeles (USA) showed that an increased FV consumption by the mother influenced the FV consumption in the entire household [64]. It therefore seems essential to work on domestic dietary behaviours, but also on food purchases habits [65].

We needed to shorten and simplify the food frequency questionnaire to reach reasonable interview duration. Since, we had no information about the portion sizes, which could have led to a lack of precision regarding various food groups. Moreover, like any self-declared questionnaires, we could not avoid a desirability bias, implying that individuals tend to overestimate their intakes of healthy food groups, and underestimate those less beneficial for health [59,64,66].

## 5. Conclusion

The participants of the FLAM study match with those initially targeted, which is families in precarious situation, but not receiving food aid. The proportion of low FV consumers is much higher than in the general population, particularly in adults. Like in previous community-based interventions and despite multiple facilitating strategies, we met recruitment difficulties impairing the power of the analysis, we explored through a qualitative study. Although the involvement of community structures and local actors was crucial to disseminate information on the study, mass mailing appeared the most effective mean for recruitment and should be considered from the very beginning for similar studies in the future.

## Declarations

### *Ethics approval and consent to participate*

Each adult participant (whether the mother or the father included with his/her child) signed a consent form, after the interviewer made sure it was well understood. The study was approved by the Ethics Review Committee of the National Institute of Health and Medical Research (*Institut National de la Santé et de la Recherche Médicale*) (Inserm) IRB00003888 under the number 15-247. The declaration to the National Commission of Data Processing and Liberties (*Commission Nationale de l'Informatique et des Libertés*) (CNIL) of February 26 2015 was made under number 1838429v0.

### *Consent for publication*

Not applicable.

### *Availability of data and material*

The datasets generated and/or analysed during the current study are not publicly available due the agreement of strict confidentiality ensured to the volunteers when the data were collected, but are available from the corresponding author on reasonable request.

### *Competing interests*

The authors declare that they have no competing interests.

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### *Authors' contributions*

CB participated to the recruitment strategy and data collection, coordinated the conduction of the study in the field, supervised the analyses and wrote the manuscript. TM analysed the data and critically revised the manuscript for important intellectual content. AMar and AMau performed the qualitative survey, wrote the qualitative section of the manuscript and critically revised the paper for important intellectual content. JG elaborated the recruitment strategy, participated to the data collection and critically revised the paper for important intellectual content. PD helped in the recruitment and data collection, and critically revised the paper for important intellectual content. SH participated to the conception of the study and critically revised the paper for important intellectual content. PL was involved in the elaboration of the protocol and critically revised the paper for important intellectual content. PLM was involved in the conception and methodology throughout the study and critically revised the paper for important intellectual content. CJ conceived the study, supervised the overall study and has primary responsibility for final content.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.conctc.2018.10.008>.

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