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Assisting towards a healthy diet for the most deprived in post-crisis Greece: An evaluation of the state food provision program

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AV and KF wrote the first draft of the manuscript. AV and KF collected and analyzed data. AP, OM and DX designed the research protocol and methods. MK secured funding and supervised the team. All authors reviewed and commented on subsequent drafts of the manuscript.

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Keywords

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Abstract

Introduction In 2016 the European Union setup its first structured food provision program to combat food insecurity. We aimed to measure the program's capacity in assisting its beneficiaries to achieve a healthy diet and measure their satisfaction.

Methods A computational study was carried out to calculate daily food provision per person under the program for January 2016-December 2017. A cross sectional survey in 3942 beneficiaries took place in December 2017-June 2018 collecting anthropometric, sociodemographic and program satisfaction data. Descriptive statistics were performed and reported as relatively frequencies, mean ± standard deviation.

Results Dairy, fresh meat, legumes, sugar, olive oil and tomato concentrate were the most commonly procured items. The program's contribution to vegetable, dairy and cereal intake was the lowest (3.4%, 6.1%, 6.0% respectively) as opposed to free sugars (12.2%) and oils (24.5%). The program's algorithm favors greatly (almost 3-fold) single person applications compared to 4+ persons applications. The monetary value was estimated at 21.23±23.4 euros/food provision, however 64.4% of beneficiaries reported a high positive impact on the household budget. 50.7% and 41.6% reported high positive impact on feelings of anxiety and security, respectively. ~70% of the beneficiaries were highly satisfied with the foods provided, with lower scores for quality and shelf-life (50.7% and 58.8% high respectively).

Conclusions The program is met by high beneficiary satisfaction and is perceived as a substantial assistance. Increases in the amounts and variety of foods delivered, with a focus on fruit, vegetables and fish should be considered, to further improve the program's dietary impact.

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Introduction

Food insecurity- the inability to acquire or consume sufficient, safe and nutritious food to meet once dietary needs and preferences for an active and healthy life, or the uncertainty that one will be able to do so- has traditionally been considered an issue for low/middle income countries (1). However, the 2008 financial crisis and its impact on food prices, food access and welfare policies resulted in a global increase in food insecurity (2–4) seen even in Europe (5–7). Although, food insecurity in Europe is more likely to be classified as mild to moderate in severity according to the World Health Organization (8,9), after decades of downward trends, 26.4% of European were at risk of food insecurity in 2016 (based on data from Eurostat) (6) a prevalence sufficient to indicate an issue of national concern (10). Despite different methodologies being used to quantify the extent and depth of food insecurity in the various surveys, the reality remains unchanged and indicates food insecurity as a rising concern for Europe.

Previous analysis in Europe has highlighted the clustering of food insecurity among those less privileged (lower income, older age, unemployed, single-parent households and persons with disabilities) and its link with social benefits and general material deprivation(11). The 2008 Recession resulted in 23.5% of the European population (118.0 million people) living in households at risk of poverty or social exclusion in 2016 (12) and at the same time in some countries like Greece the risk of poverty was 1.5-fold higher than the European average and unemployment rates were as high as 23.6% (5,13,14). In Greece, the financial crisis led to a humanitarian crisis, an increase in the burden of disease (15) while reports on the impact on dietary intake and malnutrition describing a mixed picture (16–19).

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To eliminate poverty and social exclusion the 'Fund for European Aid to the Most Deprived' (FEAD) was created in the 2014 to 2020 programming period (5,20). FEAD was designed along the lines of previous programs from other countries/regions running such initiatives since 1964 (5,21,22) and was the main policy against food insecurity in the region through the provision of material assistance including food provisions (5,20). Although FEAD's primary aim is the combat of food insecurity, it is also within the scope of the program to help its beneficiaries achieve a balanced diet while ensuring adequate access to food (23).

FEAD Greece has been implemented since January 2016 through a dedicated Central Managing Authority and a network of 57 local Social Partnerships (SPs), one for each geographical administrative unit (21), thus covering all regions in Greece. In this structure, food provisions are procured centrally by the Central Managing Authority and delivered to the 57 SPs (Centralized Supplies/CSs), with the option for the SPs to procure additional food items independently in order to address specific local needs (Decentralized Supplies/DSs) (21). Prior to FEAD, all food assistance actions were managed by NGOs and charitable organizations making this the first government-led food assistance program in Greece (24).

Given the limited literature around state interventions against food insecurity in Europe and FEAD's unique nature as the first initiative of this kind, the current study was aimed to perform an evaluation of FEAD's capacity to have an impact on its beneficiaries' diet and their quality of life (perceived impact on financial and psychological aspects) after its first year of implementation.

Methodology

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The evaluation of the program took place between January 2016 and December 2018. Firstly, operational data was analyzed in order to measure the amount, quality and variety of the foods provided to each household. Following that a cross-sectional evaluation of the program by its beneficiaries through the collection of feedback data using a structured questionnaire.

Calculation of FEAD food provision's delivered to beneficiaries

Data Collection

For the first study, operational and purchase data (as provided by the local FEAD authorities) from January 2016 to December 2017, were analyzed. The overall aim of this study was to calculate the contribution of the foods provided by FEAD towards the achievement of a healthy diet as described by the WHO guidelines (25). All analyses were conducted at a beneficiary level and diet quality was assessed as achieving the recommended intake of specific food groups as mentioned in the WHO guidelines.

Mapping of the food items provided

The operational data of both CSs and DSs were searched to identify unique food items procured and distributed by each supply separately. All foods were categorized in seven food groups (fruits, vegetables, grains, meat and alternatives, dairy, oils and free sugars) according to the WHO guidelines (25). Fruits included fresh and dried fruit and fruit juices, vegetables included all fresh and cooked vegetables, grains included all cereal based foods, meat and alternatives included meat, poultry, fish, seafood legumes and soya based products, dairy included only animal based dairy products, while oils included any fats and oils from all origins. Free sugars included

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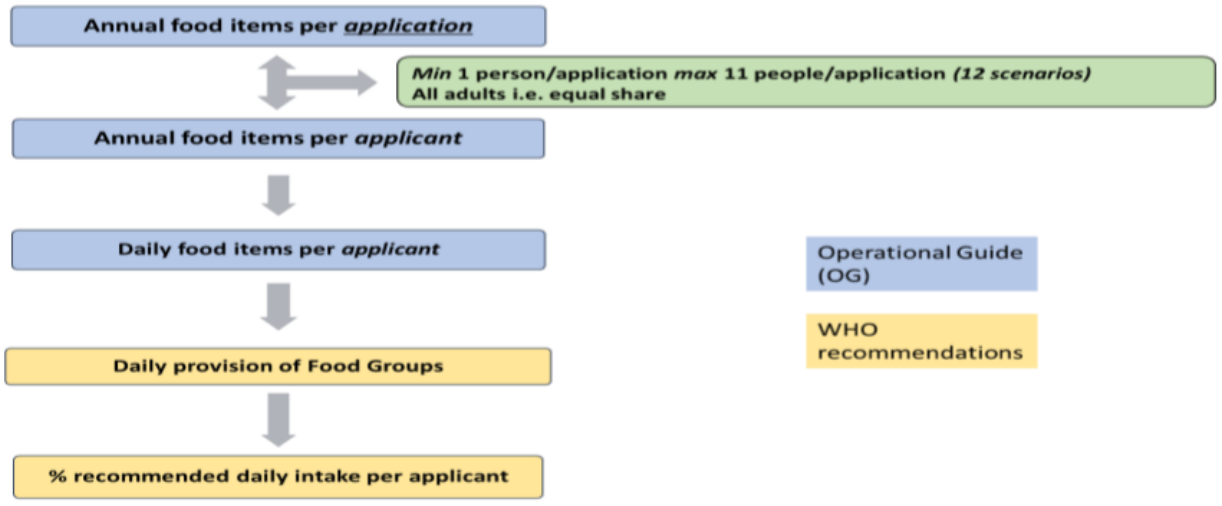
all sweets, desserts and sweetened beverages. To map differences in the utilization of the different supply routes by the SPs, the number of SPs that procured each item by either the CSs or the DSs was calculated.

Calculation of FEAD's contribution towards the achievement of a healthy diet

In order to calculate FEAD's contribution towards a healthy diet, a 5-step algorithm was created (Figure 1). As FEAD's operational data provide information for the annual food provision entitlement per application (i.e. household) the first step was to calculate the annual food provision entitlement per beneficiary. This was then translated to the daily food provision per beneficiary calculated in g/day. Daily food provisions of each food group were transformed to WHO portions/day (25) and finally portions/day were expressed as percentage of the recommended portion intake for each food group. This allowed to calculate the relative contribution of FEAD towards achieving the WHO recommended diet.

Figure 1: Schematic illustration of the methodology used to calculate the contribution of foods distributed from the Centralized Supplies in the diet (% of recommended intake)



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The annual food entitlement per application is described in the program's Operational Guide designed by the Central Managing Authority of FEAD Greece (21) taking into account twelve different household sizes (1-11 people per application/household) based on real FEAD data. For the algorithm to calculate annual food entitlement per application down to the beneficiary level simulation scenarios were created similar to 12 household sizes used in the Operational Guide. In each scenario, household sizes were calculated as adults without any special dietary needs. No provision was made for children, pregnant/lactating women etc due to lack of the relevant data and the modelling nature of the analysis.

The input data for this analysis was the Operational Guide describing the exact food provision per household size for the case of the CSs and real food distribution data for foods delivered to FEAD beneficiaries throughout a year for the DSs. The reason for this distinction is that although food procurement for the CSs follow the Operational Guide, the DSs can deviate from it in order to address local needs. As the food provision data provided by the DSs were blinded as to the exact household size per application the same algorithm with the 12 household scenarios was used as for the CSs. As a reflection of this operational set-up FEAD's contribution to the diet was calculated separately for the CSs and the DSs and then calculate FEAD's total contribution to the diet using the sum of means approach.

The contribution of CSs and DSs towards the WHO recommended diet were expressed as percentages of recommended portions per food group provided by the CSs and DSs respectively. For each food group the FEAD contribution towards the recommended food group portion intake was calculated for each of the twelve potential household sizes separately and presented using box plots showing the range and the differences among each scenario. For the total contribution of the

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CSs and DSs, the mean contributions of each supply for the 12 scenarios were added together following the sum of means approach to provide a crude estimate.

Beneficiaries' evaluation of the FEAD program

Data Collection and Research Design

The second study was designed as a cross-sectional direct evaluation of the program from its beneficiaries and took place from December 2017 – June 2018. The Ethics Committee of the Agricultural University of Athens approved the design, the procedures and the aim of the study. A consent form was given to the participants (> 18 years old) informing them about the content of the survey, the anonymity of the questionnaires and the safeguarding of personal data based on the GDPR standards.

A total of 3642 questionnaires were mailed to the all SPs (n=57) and were then distributed to the beneficiaries by the SP's staff at the time of food provision delivery within three months. The voluntary and anonymous nature of the study participation and the fact that it was not linked to the access to food provisions were clarified to all beneficiaries invited to participate. SPs were responsible for the collection of completed questionnaires. A team of dedicated researchers compiled and analyzed all data from the questionnaires.

An additional 500 questionnaires were collected by researchers during on-site visits in five SPs at the time of food provision delivery as part of larger survey on the dietary habits of FEAD beneficiaries. The selected five SPs included the capital and other urban as well as rural locations (72 municipalities from the following peripheries: Attica, West Macedonia, Central Macedonia, Crete and Peloponnese covering 66% of the total Greek population). Only beneficiaries that had

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not previously completed the self-reported FEAD evaluation questionnaire were invited to participate in the researcher assisted arm of the study.

The questionnaire included 32 questions and collected sociodemographic characteristics, self-reported anthropometry (weight & height) and questions directly aimed at evaluating the perceived beneficiary satisfaction for various aspects of the FEAD program (taste, quality, variety of foods provided) to be evaluated in a three-point scale low, average, high satisfaction. The 500 researcher assisted questionnaires included an additional three questions aiming to quantify the monetary value of the food provision as perceived by the beneficiaries and its contribution to the household budget. Namely monetary value of food provision, monetary value of provision of personal hygiene items and whether the FEAD household budget contribution would be allocated to other needs/expenses were studied. The monetary evaluation of FEAD was linked only in the independent researcher assisted questionnaires to reduce the risk of potential bias. The perceived impact of FEAD on quality of life was assessed through questions focusing on the perceived capacity of parents to provide with better foods and their perceived capacity to provide their children with a better diet overall. All questionnaires were pilot tested for clarity and their use as a self-reported or a researcher-assisted tool.

Socio-demographic variables that were recorded were: gender, age, educational level measured by years of school, number of children, number of people living in the household, occupational status (in the following categories: employed, unemployed, retired, housewife). Marital status categorized as single, married, divorced or widowed. Body weight (in kilograms) and height (in meters) were recorded as self-reported values. Body mass index was then calculated as weight (in kilograms) divided by height (in meters squared). Overweight and obesity were defined as body mass index 24.9-29.9kg/m^2 and >29.9kg/m^2, respectively.

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Statistical Analysis

Normally distributed continuous variables will be presented as mean values ± standard deviation (mean ± SD), while categorical variables as absolute and relative frequencies. The IBM SPSS Statistics 23.0 statistical software package was used for all statistical analyses (mainly descriptive statistics due to the nature of the study and the small sample size).

Results

Calculation of FEAD food provision's delivered to beneficiaries

Mapping of food items delivered by each FEAD supply chain

Overall the CSs procured and delivered just 14 unique food items, usually two food items per food group for fruits, vegetables and dairy, with the exception of cereals and grains, populated solely by spaghetti, free sugars with just granulated sugar, and meats that included all three types of the most commonly consumed meats in Greece (beef, chicken and pork) (Table 1). The DSs procured a slightly larger number of food items (n=21).

As seen in Table 1 no overlap of food items was documented between the CSs and DSs as expected from the Operation Guide. However, the choice of procuring food items through the DSs was less often used by the Social Partnerships (SPs) as only 3-40% of the active SPs delivered items procured through that route, as opposed to 17-83% delivering foods procured through the CSs route. Similar findings were seen for the utilization of the option to deliver fresh food items as opposed to those with long shelf-lives. Only 3-43% of the SPs delivered fresh fruit and

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vegetables with preference towards fresh fruit compared to 30-56% of SPs delivering canned fruit and vegetables or marmalade. The most commonly procured and delivered fresh food item was meat (43-78% of SPs, except turkey).

The top 10 most commonly delivered food items were in declining order spaghetti, beef, feta cheese, condensed milk, pork, beans, lentils, concentrated tomato juice, sugar and olive oil all procured through the CSs. The only food items procured from the CSs that were less commonly delivered to beneficiaries compared to foods procured through the DSs were fresh fruit and vegetables.

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Table 1 List of Foods procured by the Centralized and Decentralized Supplies of FEAD and the proportion of the Social Partnerships who included those foods available in their food provisions

	Foods Provided by the Centralized Supplies	Social Partnerships that distributed these foods (%)	Foods Provided ONLY by the Decentralized Supplies	Social Partnerships that distributed these foods (%)
Fruits	Oranges	35%	Kiwi	4%
			Peach	4%
	Apples	39%	Canned Fruit	30%
			Marmalade	30%
Vegetables	Cabbage	17%	Carrot	4%
			Zucchini	9%
	Tomato juice concentrate	56%	Tomato	4%
			Eggplant	4%
			Onion	4%
Cereals & Starch	Spaghetti	83%	Rice	39%
			Flour	40%
			Cornflakes	26%
			Potato	17%
			Melba toast	4%
Dairy	Feta Cheese	70%	Hard Cheese	39%
	Condensed milk	70%		
Meat and Meat Substitutes	Fresh Chicken	43%	Fresh Turkey	4%
	Fresh Boneless Pork	70%	Chicken Soup	26%
	Fresh Boneless Beef	78%		
	White dry beans	70%		
	Lentils	65%		
Oils	Olive Oil	48%	Margarine	4%
			Sunflower oil	26%
			Olives	26%
Free Sugars	Sugar	52%	Honey	30%

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Contribution of Centralized Supplies to recommended dietary intake

The food items delivered through the CSs show the capacity to cover in average less than 13% of the recommended daily intake for all food groups (mean value for all twelve household size scenarios) (Figure 2 & Appendix Table 1). The analysis of the twelve different household size scenarios (1-11 household members) indicated great variability for the percent of the daily recommended intake covered per person according to the household size. The Operation Guide's algorithm seems to favor applications for single adults especially in the calculation of the oils provision. This favorable outcome is seen up until household sizes of 4 and then the algorithm calculates the same amount of food provision for all the rest of the household sizes (Figure 2). For example, the CSs contribution towards the recommended daily intake for vegetables ranged from 0.55% to 6.03%, for cereal from 0.83% to 4.57% and for fruit from 8.97% to 16.44% (11 people household vs single person household, respectively). The largest variability was observed in Oils and Free Sugars, with an 11-fold difference between the minimum and maximum contribution.

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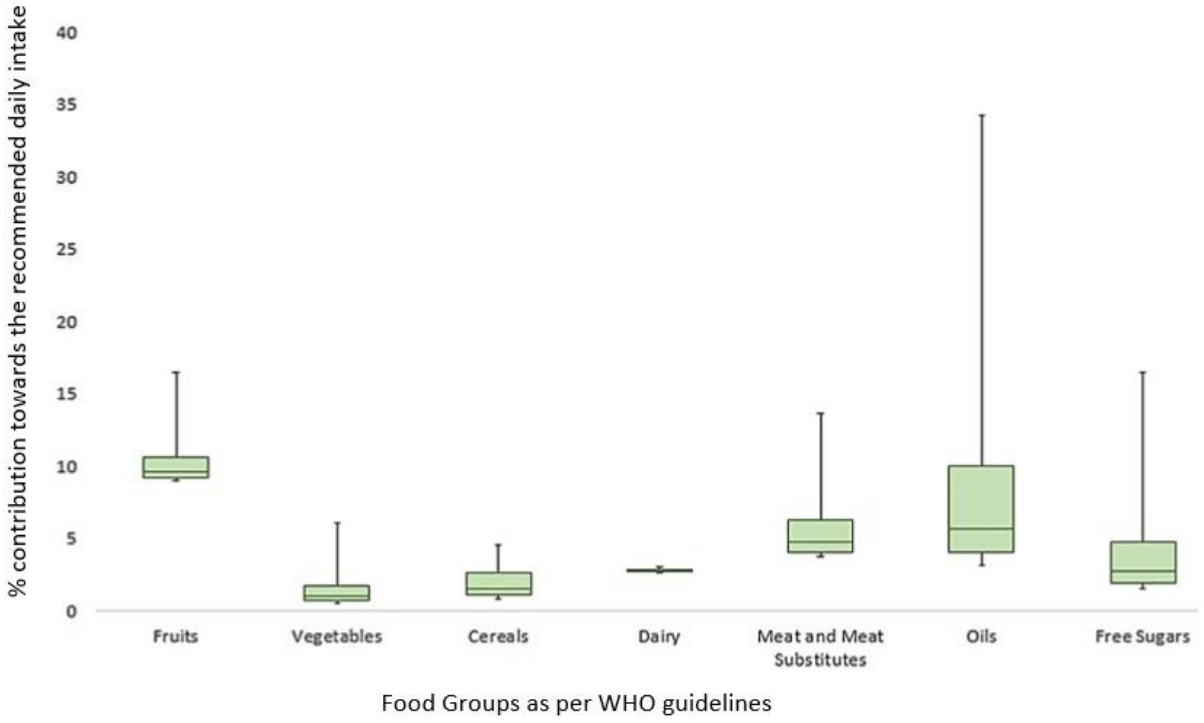
Figure 2: Contribution of FEAD's Centralized Supplies towards achieving the recommended daily intake for the seven WHO food groups.



Boxplots represent the variability between the 12 household scenarios for household sizes 1-11 persons.

Contribution of Decentralized Supplies to recommended dietary intake

At the time of the analysis (the first year of FEAD Greece implementation) only 23 of the 57 SPs opted for the option to utilize the DSs (40% of all SPs). The most commonly procured food items were meats and dairy products procured through the DSs by all 23 active SPs followed by oils and free sugars procured through the DSs by 16 SPs (69.56% of all active SPs for both). The degree of utilization of the DSs was variable even among the 23 active SPs ranging from procurement of only meat and/or dairy products (n=3) to those procuring food items that cover all seven food groups from the DSs (n=10) (Appendix Figure 1).

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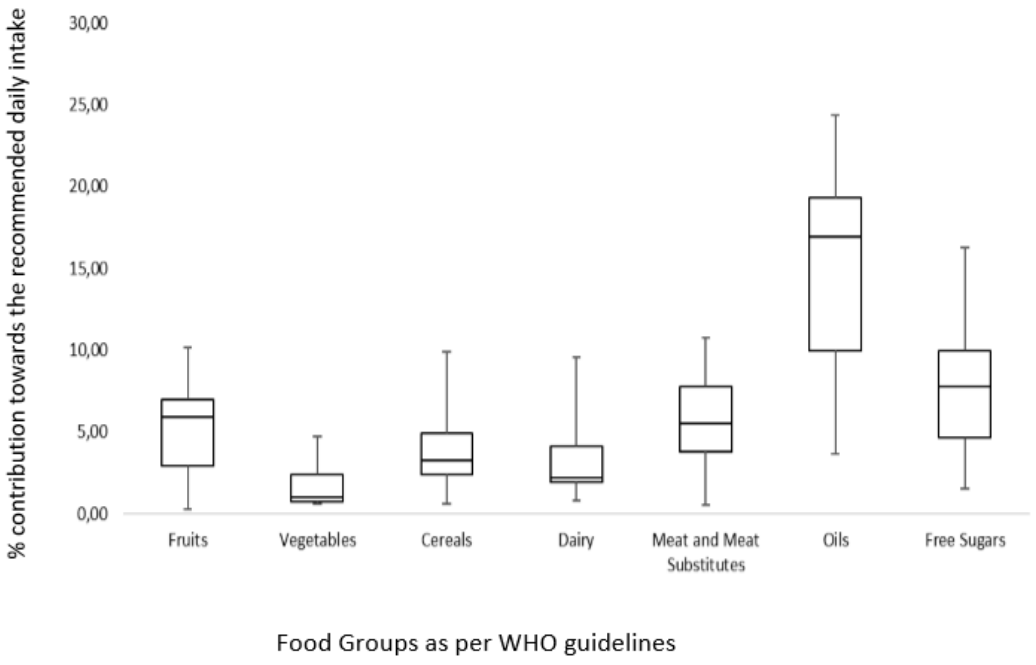
The variability in the utilization of the DSs as a supply chain is depicted in the DSs' contribution towards the recommended intake of the seven food groups as shown in Figure 3. The greatest variability was observed for fruits (42.46-fold difference between min and max contribution), followed by meat and cereal products with 19.25-fold and 15.67-fold difference between the min and max contributions. The smallest variability was seen in oils and vegetables with 6.6-fold and 7.58-fold differences between the min and max contributions (Figure 3). Overall, the DSs' showed lower capacity to contribute towards achieving a recommended intake for all food groups, except for oils, compared to the CSs. The variability of the DSs (Figure 3) is explained as a net effect of the variability introduced by the FEAD algorithm (Figure 2) and the different degree of utilization of the DS route on a local level as shown in Appendix Figure 1.

Figure 3: *Contribution of FEAD's Decentralized Supplies towards achieving the recommended daily intake for the seven WHO food groups.*



Boxplots represent the variability between the average contributions for all SPs that utilized the DSs (n=23) in each food group.

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Total Contribution

The total nutritional contribution of the food provision provided by FEAD by both the CSs and DSs was calculated as sum of the means for each Supply. The highest potential contribution towards the daily recommended intake was seen for oils (24.55%), fruits and free sugars (15.37% & 12.17%, respectively). Similar contribution to the daily needs for meats and substitutes was calculated (11.79%), while cereals, dairy and vegetables all had calculated contributions below 10% of the daily needs, even below 5% for vegetables (data not shown).

Beneficiaries' evaluation of the FEAD program

From the 3648 questionnaires sent to the 57 SPs, 1518 were completed and returned (41.7% participation rate) while two SPs did not return any questionnaires. The participation rate is relative to the activity of the SPs and the intensity of their food provisions. The two SPs that did not provide any data were not active at the time of the study. These questionnaires were analyzed together with the 500 questionnaires collected directly by researchers on site. The basic anthropometric, socio-demographic and lifestyle characteristics of FEAD recipients are presented in Table 2.

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Table 2 Descriptive statistics of the study population

	Total (n=1891)
Female (%)	52.2
Age (years)	48.1 ± 12.7
Education (years)	9.90 ± 6.0
Children (#)	2.02 ± 1.9
Household size (#people)	2.87 ± 1.6
Currently married (%)	47.7
Currently employed (%)	13.4
Duration of FEAD enrollment (months)	12.74 ± 8.4
Beneficiaries per application (#)	2.55 ± 1.6
Food deliveries received (#)	3.54± 4.3
Personal hygiene item deliveries received (#)	2.30 ± 9.6

The majority of the study participants were female (52.2%). The average FEAD participant was found to be 48.1±12.7 years old with 9.9±6.0 years of education (9 years of compulsory education in Greece), 2.02±1.9 children and living in a household of 2.87±1.6 people. The majority of study participants were unemployed or a pensioner (86.6%) and single, divorced or widowed (52.3%). The average application size was for 2.55±1.6 people and the average duration of enrollment in FEAD was 12.74 ± 8.4 months during which they had participated in 3.54 ±4.3 food deliveries, approximately one food delivery every three months. Only 32.8% of the participants

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declared having received a delivery of personal hygiene items and for those the average declared such delivery 2.30 ±9.6 times throughout their enrollment.

As far as anthropometry is concerned, the prevalence of underweight was 2%, while the prevalence of overweight and obesity were 40.7% and 18.6% respectively (Table 2). Men were more likely to have a BMI higher than 25 or 30 compared to women ($p<0.001$ and $p<0.045$ respectively, data not shown) and vice versa for a BMI<18.5 ($p<0.001$, data not shown).

As shown in Figure 4a, the majority of FEAD participants when asked to score the food provisions for taste, variety and visual aspects declared high satisfaction (~70%). Fewer participants indicated high satisfaction with the shelf life and quality of the foods provided (59% and 50.6% respectively). No differences were seen between men and women for all elements tested (data not shown).

Only 19.9% of the study participants declared that being enrolled in the FEAD program did not improve their feeling of security and 14.5% declared no help with feeling less stressed (Figure 4b). Just 15% of the participants felt that FEAD did not help them provide their children with better quality food (Figure 5). Only 1.5% of the study participants felt that FEAD should be discontinued but 20.3% would like for the program to continue with improvements. When asked for specific food items (legumes, pasta, rice, milk, cheese, meat, fruit & vegetables, and olive oil) >80% of the participants declared using the respectively food provision a lot (data not shown).

Finally, in terms of the financial aspects of the FEAD program 55.6 % of the participants felt that the program highly supported the family budget (Figure4b) and when asked to estimate the cost of the items received by FEAD at each delivery the estimated the average cost for food items to be 21.23±23.4 euros and 11.9±12.2 euros for the personal hygiene items. The estimated cost of each food delivery was negatively associated with the number of people per application

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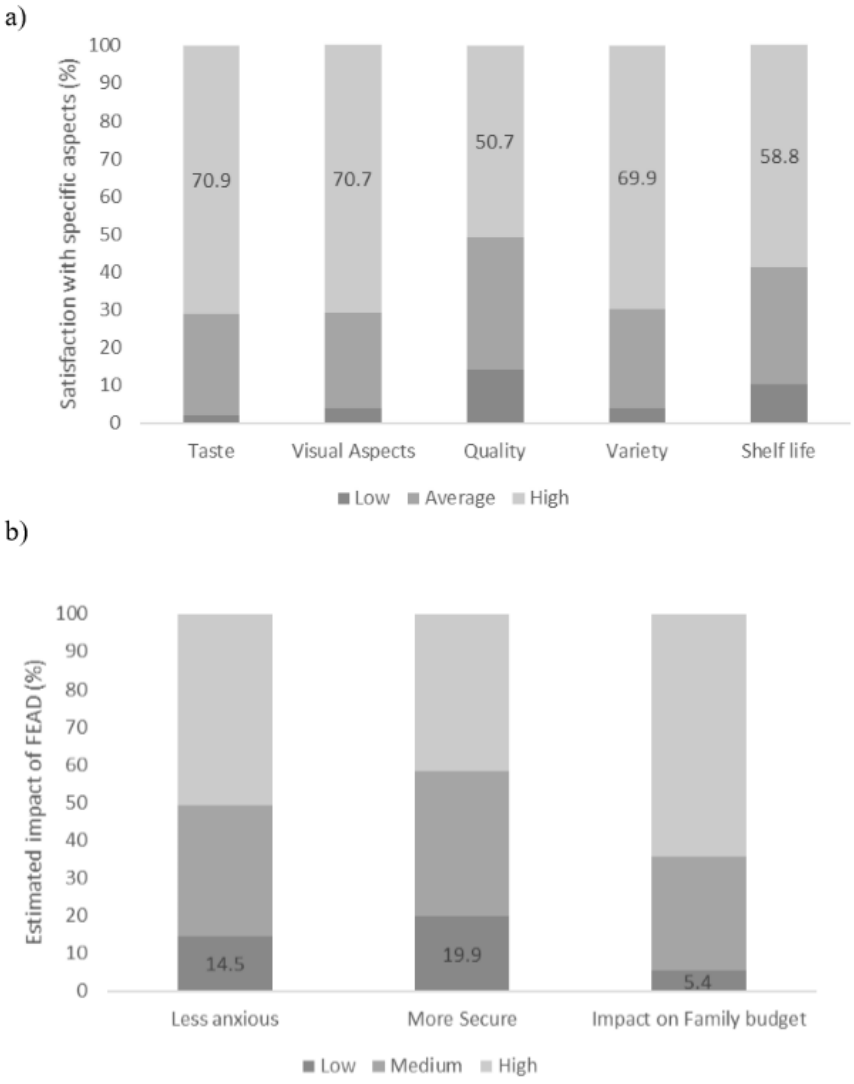
(Pearson r=-0.39, p<0.001). 44.6% of the participants said that the money saved from the FEAD deliveries would be spent towards utility bills, 25.1% would spend it towards rent and 19.0% would invest it in further food purchases (data not shown).

Figure 4: *a) Participant declared satisfaction by the taste, quality, shelf life, variety and other visual aspects of the FEAD provided food items, b) Participant declared impact of FEAD on feeling more secure, less anxious and supporting the family income*



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Discussion

The Fund for European Aid for the most Deprived (FEAD) is a policy that has now entered its fourth year of implementation in Greece with the main purpose to provide material assistance to people living in the brick of poverty. This is the first attempt to assess the program's potential to help its beneficiaries achieve a healthy diet and to report on their evaluation of the program.

Our analysis identified 35 individual food items representing all seven recommended food groups as the items included in FEAD's food provisions. As per the program's set up the CSs had a smaller variety of food items representing staple foods items and were the main supply chain used for all the SPs. On the other hand, the DSs procured a larger variety of items especially for fruits, vegetables and cereals but were less commonly used as a supply chain option.

From the food items analysis, it became evident that protein sources like meats, dairy and legumes were the most commonly procured items, second only to pasta and followed by the oils. Unfortunately, foods items from the free sugars food groups were also commonly procured. These results are in line with previous reports identifying that cereal, pasta, free sugars and other non-perishable food items are the most common foods delivered from food banks, food pantries and similar initiatives (26–29). Data from the USA indicate that when given the choice food bank users would show a preference towards such food items (28), while in other countries in Southeast Asia there would be a mix of staple, long shelf life items and cooked food (30,31).

The analysis of both the CSs and DSs showed that each supply separately contributes in average less than 10% of the recommended daily intake for each food. However, when accounted for together, the total contribution of FEAD can reach almost 25% of the needs for oils, 15% of the needs for fruit and just above 10% for meats/substitutes and free sugars. The contribution towards food groups like vegetables cereal and dairy is particularly low less than 10% and even less than

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5% for vegetables, which is a common finding in all analysis (total, CSs and DSs). In order to bring these results in context is important to remember that in its conception FEAD was designed as a program to work alongside existing initiatives (school lunch program, soup kitchens etc.) in order to combat food insecurity and not in isolation (5). Previous reports on the nutritional quality of the foods provided by food pantries across the world showed that low provision of fruits & vegetables, milk products and a higher provision of meats & alternatives are common findings among food provision programs and could be linked with the perishable nature of some of these products (32,33). In the case of FEAD Greece, the perishable nature of meats was not an issue as all meats (beef, pork, poultry and lamb) were provided fresh but the same was not true for fish, which was not provided in any form (fresh or canned). This effect is also seen in previous report analyzing the nutritional intake of food bank users, who are reported to largely fail to meet the recommended intake for fruits, vegetables and dairy products (34–37). An analysis of the US food pantries highlighted that the low dietary quality of food pantries' food provision could be linked to their high reliance on charitable donations and food banks as high nutritional quality foods are provided mainly through the governmental The Emergency Food Assistance Program (similar to FEAD) but that accounts only for 25% of the foods available in food pantries' inventories (38). Relatively to similar programs in the US (food pantries) with an estimated contribution of 25% in the beneficiaries monthly dietary intake, FEAD's contribution could be evaluated as relatively low, although direct comparisons are difficult due to methodological issues (estimation of monthly vs daily dietary intakes) (39).

The evaluation of the FEAD program directly by its beneficiaries highlighted that despite the program's relatively small contribution towards a healthy diet, the beneficiaries evaluate the program positively both in terms of the food items provided and its contribution towards the

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household budget. Based on the data collected the beneficiaries estimated the financial support received by FEAD to be approximately 20 euros per delivery which would account for roughly 120 euros per year based on the frequency of FEAD deliveries at the time of the study. FEAD participants showed high level of satisfaction with the taste, variety, shelf life and visual aspects of the foods provided and were less satisfied with the quality. Quality issues have been previously reported as the main point of dissatisfaction among food bank users however FEAD participants were not as concerned about quality as food bank users, according to the literature (26,29,40). A potential explanation for that could be that FEAD unlike food banks does not rely on charitable industry donations for its food procurement. This reliance on industry donation, despite promoting sustainability and reducing food waste, has been highlighted as a major drawback of food banks especially when it is linked to enriching food donations with high quality foods and fresh produce (29,41). The issue of increasing the nutritional value of the food provided by FEAD was not highlighted by the beneficiary survey but was documented from the computational analysis of the food provisions delivered (study 1). FEAD could follow the example of existing food bank initiatives in the USA and adopt a number of policies that would improve the nutritional quality of the foods delivered (42,43). The nutritional impact of FEAD would also be maximized by taking into account previous data highlighting that FEAD recipients in Greece still experience low energy and protein intake and fail to meet the recommended intake for a number of food groups especially fruits & vegetables and fish (18). For the case of fish, since it is not supplied by FEAD all reported intake would have been secure through different sources. Alongside with the high satisfaction on the food level, most participants were positive when asked whether FEAD should be continued, with some requesting improvements and the majority of the participants felt that the program did have an impact on improving their perceived sense of security, anxiety and their concerns about

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providing their children with nutritious food. Additionally, despite assigning a relatively small monetary value to the foods provided by FEAD the majority of the beneficiaries felt that it did have an impact on the household budget. This finding is common among similar initiatives and highlights the emotional value that having access to a structured food provision program has for this population (27,31). All these findings however, refer to the beneficiaries' perceived impact of the FEAD program on their livelihood, dietary quality and quality of life and do not assess 'real' changes.

Despite, the useful insights this study is not free of limitations. The main limitations can be linked to the simulation analysis used to convert FEAD's annual food provision entitlement to the food provision per beneficiary. The lack of real data for both the CSs and DSs per application linked to the application size and the true household size hinders the capacity to estimate accurately FEAD's contribution to the diet of its beneficiaries. Especially the lack of data for true household composition data on the number of children, older adults, pregnant or lactating women, people with disabilities or in general any individual with special dietary requirements, reduces the accuracy of the estimation of FEAD's contribution to the daily diet. However, this is a limitation mainly linked to foods provided by the DSs, and at the time of the study this supply route was still underutilized. Moreover, although simulation analyses have been shown to be useful in estimating the potential of a proposed intervention/policy and to compare between policies and scenarios, the evaluation of a program's effectiveness in lifting food insecurity would require direct population sampling before and after the intervention (44,45). At the same time, it is important to highlight that as FEAD is an ongoing program it is important to treat these data as reflection of the program at the time of the study. More longitudinal data on FEAD would greatly improve the capacity to

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evaluate the program's implementation over time and monitor potential changes through beneficiary feedback or improvements made by the FEAD managing authority and their impact on the beneficiary evaluation. Overall, the study highlights important short-term steps required to improve the program's implementation and maximize its impact but nonetheless greater initiatives addressing the underlying causes of food insecurity should also be put in place in order to decrease dependency on governmental aid and promote societal prosperity (46).

Conclusions

FEAD is an example of the relatively new food policies in Europe aiming to address food insecurity and this study is the first to highlight areas of improvement but also identify strong points in the program. In summary, the program seems to be well received by its beneficiaries to the extent that it scores better than existing food bank programs in the literature. A strong point for FEAD is its capacity to procure fresh foods instead of relying solely on food donation of non-perishable or low market value foods. However, the variety of the foods procured could be improved with a larger focus on fruits and vegetables. This could be achieved by a greater utilization of the DSs and a better linkage with the school lunches program which are both government-led initiatives. Another area of improvement is the update of the Operational Guide with a focus on decreasing inequalities and providing a more linear relationship between household sizes, household needs (composition in vulnerable groups-children, pregnant/lactating women, etc) and the amount of foods provided (currently the guide favors smaller households).

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

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