

# 1 Implementation of European School Fruit and 2 Vegetables Scheme in Spain (2009-2017)

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11 **Abstract:** The School Fruit and Vegetables Scheme (SFVS) implemented by the European Union  
12 during 2009/10 aims to improve the diet of school children and to support agricultural markets and  
13 environmental sustainability. The objective of this study was to characterize the SFVS  
14 implementation in Spain (2009-2017). A descriptive, longitudinal, observational and retrospective  
15 study was carried out based on document analysis of annual strategies of the SFVS. We studied the  
16 average budget for the EU, the number of students enrolled, the cost of the SFVS by student and by  
17 day, the duration of the SFVS, the quantity of fruits and vegetables (FV) per student, the variety of  
18 FV, the inclusion of local, seasonal and organic foods, and the education activities (EA). The results  
19 were studied by autonomous community (AC). The budget increased from 7.4 million euros in  
20 2009/10 to 14.4 in 2016/17. Since 2014/15, the increase came from EU funds, the number of students  
21 increased from 18% in 2009 to 20% in 2016. The quantity of FV went from 2,579 to 4,000 tons,  
22 duration increased from 9.8 to 19.6 days and the variety of fruits and vegetables increased from 20  
23 to 21 and from 5 to 6 respectively. In AC there were important variations in EA, in the number of  
24 enrolled students (7.4% to 45.6%), in the cost per student (2.3€ to 28€) and in the duration in days  
25 (5.6 to 70 days). The inclusion of local, seasonal and organic foods was identified in 5 of the 8 years  
26 studied. The development and reach of the SFVS in Spain is still insufficient to influence dietary  
27 patterns and health in the school population. However, the SFVS has generated an economic market  
28 for agricultural production.

29 **Keywords:** Child; Fruit; Vegetables; School Health Services; Public Policy; Environment and Public  
30 Health.

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## 32 1. Introduction

33 The low intake of fruits and vegetables (FV) is an important risk factor for the development of  
34 non-transmissible diseases[1,2]. Promoting their consumption starting in infancy is a priority for  
35 public health thanks to their ability to lower the burden of disease[3]

36 From this perspective, the European Commission (EC) recognizes the importance of developing  
37 a plan to promote the consumption of fruit and vegetables in schools, supported by the EU[4]  
38 (Commission of the European Communities, 2007), and in the 2009/10 school year the School Fruit  
39 and Vegetables Scheme (SFVS) was implemented. The SFVS aims to act on health, diet, agricultural  
40 markets, social equality and regional cohesion[5,6].

41 The SFVS is carried out through annual projects financed by the European Commission, by the  
42 central government and by regional governments ((autonomous communities) in the case of Spain)[7]  
43 It also includes the distribution of free FV to school students, and a series of education activities (EA)  
44 designed to stimulate healthy eating habits in the child population in the short and long term[5,7,8].

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46 Following the international recommendations for promoting a healthy diet[2,9], the SFVS is an  
47 integral and coordinated strategy among different sectors, that articulates agricultural production of  
48 FV with consumption in schools[6]. This set up gives it potential to influence different determinants  
49 of health such as education, environment, agriculture and employment[10]. The SFVS aims to  
50 improve eating habits but also to support the distribution of local and seasonal products using short  
51 commercial chains with active participation of agricultural producers[4]. Using this distribution  
52 formula for foods has been identified as a strategy that contributes to promoting a more sustainable  
53 and healthy food system[11–13].

54 Currently in Spain the SFVS is being carried out in different AC in a coordinated way between  
55 the Ministry of Agriculture, Fishing and Food (MAPA) and the Ministry of Health, Social Services  
56 and Equality and the Ministry of Education, Culture and Sports[8]. However, although the SFVS  
57 has been implemented since 2009, there is little information on its development or evaluation to date.  
58 Given the potential of the SFVS to support more sustainable and healthy food systems, its  
59 implementation and development in Spain continues to be important. The objective of this study is  
60 to describe the implementation and evolution of the School Fruit and Vegetables Scheme in Spain  
61 from 2009 to 2017.

## 62 2. Materials and Methods

63 We carried out a descriptive, longitudinal, observational and retrospective study nationally  
64 based on secondary sources. Sources included all of the annual SFVS plans in Spain from 2009/10 to  
65 2016/17, available on the webpage of MAPA[7,14–20].

66 Of the documents consulted the following variables were extracted by academic course and AC:  
67 European and state budget (€), number of students enrolled (n), duration of the SFVS (days), quantity  
68 of FV included (t), varieties of FV (n), inclusion of local foods (yes, no), seasonal foods inclusion (yes,  
69 no), organic foods inclusion (yes, no) and education activities.

70 For each AC and academic course, the average budget financed by the EU and by state was  
71 calculated (€, %), the students enrolled in the SFVS (n,%), the cost of the SFVS per student and per  
72 day (€), the duration of the SFVS (days) the quantity per student (kg), and the variety of FV (n). In  
73 order to calculate the average number of students enrolled, the average cost per student and the  
74 average quantity of FV per student, the values were weighted by the number of students enrolled in  
75 the SFVS in each studied autonomous community. To calculate the percent of students served by the  
76 SFVS the group of those enrolled between 3-18 years in reach respective autonomous community  
77 was used as the reference group[21]. The data are presented for the whole of Spain by academic  
78 course and by AC. In the case of AC, the number of times that local, seasonal and organic foods were  
79 included is also shown.

80 Also, with the objective of exploring the varieties of FV that were most frequent in the SFVS, we  
81 accounted for the number of times that each fruit or vegetable was included in the SFVS in each AC.

82 To know the educational strategies used by each AC in the SFVS, the EA were grouped into six  
83 categories: 1. Playful educational activities (campaigns, contests, workshops, games, theatrical  
84 performances and exhibitions on food habits, merchandising, FV calendars, gymkhanas, comics and  
85 animations about FV consumption, miniseries); 2. Didactic material, 2. didactic material (posters,  
86 brochures, cards, posters, teaching units, pedagogical guides, web resources); 3. visits to the field and  
87 / or to farms, producers and commercialization of FV; 4. training sessions (lectures, talks, colloquia  
88 for teachers, students and parents); 5. cooking workshops (cooking competitions, preparation of  
89 dishes with FV, tasting of products, sensory tastings and preparation of recipes with fruit); and finally  
90 6. school gardens that included agricultural workshops and gardening sessions. The number of times  
91 each of them was present in the SFVS was counted by autonomous community and academic year  
92 and the first year of incorporation was identified.

## 93 3. Results

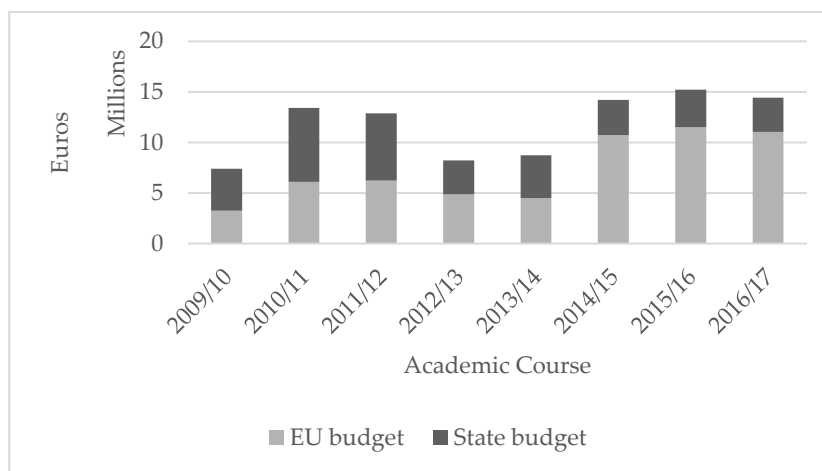
94 Table 1 describes the SFVS in Spain from 2009 to 2017. During the eight years studied, the SFVS  
 95 was implemented in 14 to 15 Autonomous Regions of the 17 that make up Spain. During the first  
 96 year, SFVS coverage reached 18.6 percent of the students. Although this figure fell in 2013 (15.6%), it  
 97 increased again in the following years, reaching 20.5 percent in the 2015/16 academic year. The cost  
 98 per student went from 7.8 euros in 2009/10 to almost 10 euros in the last year, and had a notable  
 99 reduction in the 2012/14 period. The duration of the SFVS grew gradually, with an average of 9.8 days  
 100 in 2009/10 rising to 19.6 days in the 2016/17 academic year. The average cost per student and day was  
 101 reduced across the entire period, from 1.80 euros in 2009/10 to 0.51 euros in 2016/17. The offering of  
 102 FV also increased, reaching 4,000 tons (2.8 kilos per student) in 2016/17. The variety of fruits remained  
 103 constant, including approximately 21 varieties. The variety of vegetables increased from 5 to 10  
 104 (between 2009/10 and 2016/17).

**Table 1.** Characteristics of the School Fruit and Vegetables Scheme in Spain: Averages for the 2009/17 period.

| School year | AC | Students (mil.) | Cost per student/year | Duration | Cost per student/day | Quantity of FV included | Quantity of FV per student | Variety |    |
|-------------|----|-----------------|-----------------------|----------|----------------------|-------------------------|----------------------------|---------|----|
|             |    |                 |                       |          |                      |                         |                            | F       | V  |
|             | n  | n (%)           | €                     | days     | €                    | t                       | Kg                         | n       | n  |
| 09/10       | 14 | 1.29 (18.6)     | 7.8                   | 9.8      | 1.80                 |                         |                            | 20      | 5  |
| 10/11       | 14 | 1.28 (18.2)     | 8.2                   | 12.4     | 0.66                 |                         |                            | 20      | 7  |
| 11/12       | 15 | 1.32 (18.5)     | 8.3                   | 10.2     | 0.81                 | 2579.5                  | 1.9                        | 22      | 11 |
| 12/13       | 15 | 1.28 (17.9)     | 6.4                   | 11.2     | 0.57                 | 3992.8                  | 3.3                        | 21      | 7  |
| 13/14       | 14 | 1.12 (15.6)     | 6.9                   | 12.3     | 0.56                 | 2663.4                  | 2.4                        | 21      | 8  |
| 14/15       | 14 | 1.44 (19.9)     | 7.3                   | 11.0     | 0.66                 | 3068.8                  | 2.1                        | 17      | 9  |
| 15/16       | 14 | 1.49 (20.5)     | 7.8                   | 16.2     | 0.48                 | 3464.7                  | 2.3                        | 18      | 9  |
| 16/17       | 14 | 1.45 (20.0)     | 9.9                   | 19.6     | 0.51                 | 4000.8                  | 2.8                        | 21      | 10 |

AC: autonomous communities; FV: fruits and vegetables F: fruits; V; vegetables

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 106 Figure 1 shows the annual distribution of the country and EU budget for the SFVS in Spain. In 2009,  
 107 financing came mainly from country funding. In the two years after, there was an increase in the  
 108 country-level and European budgets. For the 2012/14 period, both budget sources decreased, with  
 109 the reduction from the country fund being more pronounced. In the last period of 2014/17, the  
 110 allocation of country funding continued to fall, however, the global budget increased due to the funds  
 111 allocated by the EU.  
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**Figure 1.** Annual Distribution of Budget Supplied by the EU and the Country of Spain for the Implementation of the School Fruit and Vegetables Scheme.

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Table 2 shows the characteristics of the SFVS in the autonomous regions during the 2009/17 period. Except for Madrid, which did not join the SFVS, the other autonomous communities participated in between three (Cantabria and País Vasco) and eight editions during the period studied. Andalucía and Cataluña had a higher average budget than the rest of the autonomous communities. However, SFVS coverage for students was higher in Cantabria (64%) and Castilla y León (45.6%). The average cost per student was higher in Navarra (€ 28.4) and La Rioja (€ 19.3). Both communities also had a longer average duration of the SFVS (69.9 and 70.8 days respectively). Galicia, Cantabria and Navarra were the autonomous communities with the lowest average cost of SFVS per student per day, (€ 0.20, € 0.30 and € 0.50, respectively). The autonomous communities that declared the highest number of fruits and vegetables per student per year were Navarra (8.1Kg) and Islas Canarias (5.1Kg). Regarding the variety of fruits, there was great variability among the Autonomous Communities: from 13.4 in Cataluña to 1.9 in Navarra. Vegetables were not included in four of the AC (Aragón, Asturias, Galicia and País Vasco). Except for Aragon and Navarra, the rest of the autonomous communities incorporated local foods in at least two editions of the SFVS from the 2012/13 academic year. Seasonal foods were incorporated in all of the AC in some edition. However, 7 of the 16 AC did not include organic foods in any edition of the SFVS.

**Table 2.** Characteristics of the School Fruit and Vegetables Scheme by AC: Averages for the 2009/17 Period

|                       | Edition | Budget          | Students<br>(x1000) | Cost per<br>student/<br>year | Duration | Cost per<br>student/<br>day | Quantity<br>of FV per<br>student | Variety |            | Inclusion of foods |          |         |
|-----------------------|---------|-----------------|---------------------|------------------------------|----------|-----------------------------|----------------------------------|---------|------------|--------------------|----------|---------|
|                       |         |                 |                     |                              |          |                             |                                  | Fruits  | Vegetables | Local              | Seasonal | Organic |
|                       |         |                 |                     |                              |          |                             |                                  | n       | n          | Nº of editions     |          |         |
| <i>Spain</i>          |         | 12011.3 (100.0) | 1334.3<br>(18.7)    | 9.0                          | 12.8     | 0.71                        | 2.5                              | 7.0     | 0.9        | 8                  | 8        | 0       |
| <i>Andalucía</i>      | 8       | 2154.6 (17.9)   | 255.2(17.6)         | 8.4                          | 5.6      | 1.9                         | 2.2                              | 6.8     | 1.4        | 5                  | 5        | 5       |
| <i>Aragón</i>         | 8       | 555.8 (4.6)     | 60.3 (31.5)         | 9.2                          | 16.3     | 0.8                         | 2.3                              | 6.1     | 0.0        | 0                  | 2        | 0       |
| <i>Asturias</i>       | 6       | 290.8 (2.4)     | 26.0 (21.8)         | 11.2                         | 33.5     | 0.6                         | 3.1                              | 8.5     | 0.0        | 2                  | 3        | 1       |
| <i>Islas Baleares</i> | 8       | 158.4 (1.3)     | 27.0 (16.6)         | 5.9                          | 11.8     | 1.8                         | 0.9                              | 9.5     | 0.1        | 5                  | 3        | 0       |
| <i>Islas Canarias</i> | 8       | 459.4 (3.8)     | 28.9 (9.5)          | 15.9                         | 42.4     | 0.6                         | 5.1                              | 8.6     | 0.4        | 5                  | 4        | 4       |
| <i>Cantabria</i>      | 3       | 116.7 (1.0)     | 50.4 (64.0)         | 2.3                          | 7.0      | 0.3                         | 0.2                              | 8.7     | 1.0        | 2                  | 2        | 2       |
| <i>CLM</i>            | 8       | 745.5 (6.2)     | 49.0 (14.7)         | 15.2                         | 18.3     | 1.5                         | 2.1                              | 9.5     | 1.0        | 5                  | 4        | 1       |
| <i>CyL</i>            | 8       | 700.0 (5.8)     | 144.0 (45.6)        | 4.9                          | 9.9      | 0.8                         | 2.0                              | 2.3     | 0.8        | 5                  | 5        | 1       |
| <i>Cataluña</i>       | 8       | 2149.2 (17.9)   | 297.3 (25.2)        | 7.2                          | 13.0     | 0.9                         | 3.6                              | 13.4    | 1.8        | 2                  | 5        | 0       |
| <i>Extremadura</i>    | 7       | 378.2 (3.1)     | 36.7 (22.4)         | 10.3                         | 13.9     | 1.1                         | 2.4                              | 7.7     | 0.3        | 4                  | 5        | 0       |
| <i>Galicia</i>        | 7       | 256.6 (2.1)     | 111.3 (32.8)        | 2.3                          | 17.9     | 0.2                         | 1.4                              | 11.0    | 0.0        | 5                  | 5        | 4       |
| <i>La Rioja</i>       | 8       | 216.9 (1.8)     | 11.2 (24.1)         | 19.3                         | 70.8     | 2.2                         | 6.4                              | 3.1     | 1.7        | 3                  | 2        | 2       |
| <i>Murcia</i>         | 8       | 512.0 (4.3)     | 43.4 (16.7)         | 11.8                         | 22.8     | 1.1                         | 1.6                              | 6.5     | 5.5        | 5                  | 5        | 0       |
| <i>Navarra</i>        | 8       | 208.2 (1.7)     | 7.3 (7.4)           | 28.4                         | 69.9     | 0.5                         | 8.1                              | 1.9     | 0.3        | 0                  | 5        | 0       |
| <i>País Vasco</i>     | 3       | 125.0 (1.0)     | 13.9 (4.4)          | 9.0                          | 7.0      | 1.3                         | 0.3                              | 4.3     | 0.0        | 2                  | 2        | 2       |
| <i>Valencia</i>       | 8       | 1767.9 (14.7)   | 231.3 (30.9)        | 7.6                          | 9.7      | 0.7                         | 1.1                              | 3.9     | 0.5        | 4                  | 4        | 0       |

AC: autonomous communities FV: fruits and vegetables; CLM: Castilla la Mancha; CyL: Castilla y León

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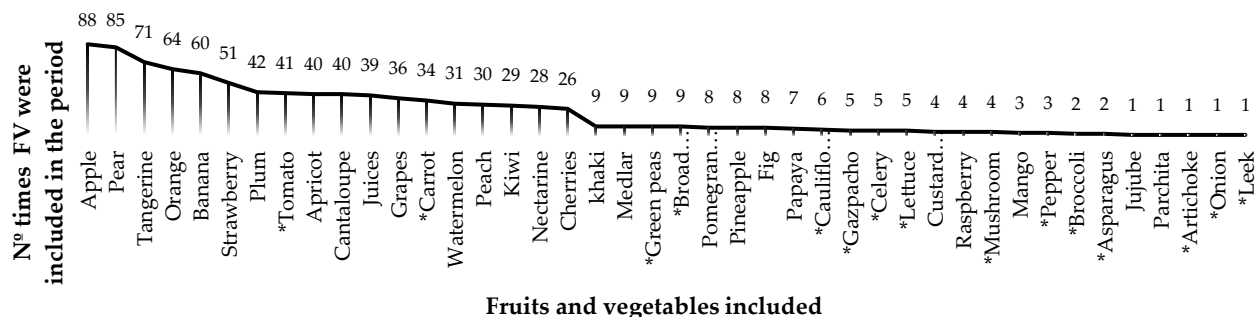
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Figure 2 shows the frequency and variety of fruits and vegetables included in the SFVS in the schools in the whole of Spain. The frequency of and variety of fruits was more predominant than that of vegetables. The most frequent fruits were apples and pears (88 and 85 times respectively), and for vegetables the most frequent were tomatoes and carrots (41 and 34 respectively).



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**Figure 2.** Frequency and Variety of Fruits and Vegetables Included in the School Fruit and Vegetables Scheme in Spain (2009-2017)

Finally, Table 3 shows the EA included in the strategies of the different autonomous communities. Andalusia and Murcia stood out for their greater variety of EA in the different editions of the SFVS, and Cantabria for not having any. Recreational-educational activities, elaboration of didactic materials and visits were the most frequent activities in AC during the 2009/17 period. Andalusia was a pioneer in the implementation of education activities to accompany the SFVS compared to the rest of the autonomous communities. By 2009 this community had declared recreational-educational activities, the elaboration of didactic materials, and training days, and in later editions it incorporated cooking workshops and school gardens. Visits to agricultural centers or vegetables gardens as well as fruit and vegetable producers and marketers were reported for the first time in Catalonia and Murcia in 2010/11.

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**Table 3:** Education Activities Accompanying the School Fruit and Vegetables Scheme for each Autonomous Community (2009/2017): number of times (first year)

| AC             | Recreational-educational activities | Didactic materials | Visits    | Training workshops | Cooking classes | School gardens |
|----------------|-------------------------------------|--------------------|-----------|--------------------|-----------------|----------------|
| Andalucía      | 7 (2009)                            | 7 (2009)           | 1 (2011)  | 5 (2009)           | 6 (2010)        | 1 (2013)       |
| Aragón         | 4 (2011)                            | 1 (2016)           | 2 (2015)  |                    | 1 (2016)        |                |
| Asturias       |                                     | 2 (2015)           | 1 (2016)  |                    | 1 (2016)        |                |
| Islas Baleares | 3 (2012)                            | 2 (2010)           |           | 1 (2010)           | 1 (2015)        | 2 (2015)       |
| Islas Canarias | 3 (2012)                            |                    | 2 (2012)  | 2 (2012)           | 2 (2012)        |                |
| Cantabria      |                                     |                    |           |                    |                 |                |
| CLM            | 3 (2013)                            | 1 (2009)           |           | 3 (2009)           |                 |                |
| CyL            |                                     |                    | 2 (2015)  | 1 (2016)           | 1 (2016)        |                |
| Cataluña       | 3 (2011)                            | 4 (2010)           | 4 (2010)  |                    | 1 (2016)        |                |
| Extremadura    | 3 (2014)                            | 2 (2014)           | 3 (2014)  |                    | 1 (2016)        | 2 (2015)       |
| Galicia        | 1 (2015)                            | 1 (2016)           | 2 (2013)  |                    |                 |                |
| La Rioja       | 2 (2015)                            | 2 (2015)           | 2 (2015)  |                    | 1 (2015)        |                |
| Murcia         | 6 (2010)                            | 3 (2013)           | 4 (2010)  | 3 (2010)           | 1 (2016)        | 1 (2016)       |
| Navarra        | 3 (2013)                            | 3 (2014)           |           |                    |                 | 1 (2015)       |
| País Vasco     | 2 (2012)                            | 1 (2013)           |           | 2 (2012)           |                 |                |
| Valencia       | 2(2010)                             | 4 (2010)           | 1 (2016)  | 5 (2010)           |                 |                |
| <b>TOTAL</b>   | <b>41</b>                           | <b>33</b>          | <b>24</b> | <b>22</b>          | <b>16</b>       | <b>7</b>       |

CLM: Castilla la Mancha; CyL: Castilla y León

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#### 4. Discussion



156 The purpose of this study was to characterize the implementation and evolution of the School  
157 Fruit and Vegetables Scheme in Spain. The majority of the AC participated in the different editions  
158 of the SFVS. Although it had an increasing coverage of the students, its scope was limited. In addition,  
159 the development of the SFVS in each of the AC was very heterogeneous. The SFVS received more  
160 and more financial support from the European Union for its implementation, while funding at the  
161 state level was progressively reduced. Even so, the quantities of fruits and vegetables provided in the  
162 SFVS increased. This, together with the incorporation of local, seasonal and ecological foods in some  
163 autonomous regions is in accordance with the strategies to promote a healthy diet and a more  
164 sustainable food system.

165 The participation of the AC in the different editions of the SFVS, shows their interest in  
166 incorporating in their educational offerings the international recommendations to promote the  
167 consumption of fruits and vegetables among the child population. Childhood is the ideal time to  
168 establish healthy eating behaviors, since these will probably persist in adult life[22–24].

169 The availability of fruits and vegetables in the school environment seems to encourage  
170 consumption among children[25–27], which helps to reduce the intake of unhealthy foods[28,29].  
171 However, the distribution of fruits and vegetables alone is not sufficient to establish a healthy eating  
172 pattern[27,30–32]. Other complementary actions are required to increase information and raise  
173 awareness of the benefits of their consumption [31–34]. Thus the SFVS should be accompanied by  
174 education activities.

175 However, the large number of theory-based training activities (didactic material and training  
176 sessions) that are being developed may limit the scope of the educational objectives of the SFVS, given  
177 that they emphasize the conceptual objectives of the SFVS more than changing attitudes or  
178 procedures. In fact, previous studies show that with recreational-educational activities and cooking  
179 workshops better results are achieved[33–36]. In addition, the potential benefits of SFVS to improve  
180 the dietary pattern of school children can be compromised by the high variation observed in the  
181 different autonomous regions and the program sustainability[37,38]. As our results show, although  
182 SFVS coverage increased throughout the period studied, its scope was limited, both by the number  
183 of days devoted to its development and by the number of students enrolled.

184 The heterogeneous development of the SFVS in the autonomous communities observed in the  
185 variables studied suggests unequal access to the program of the students according to their place of  
186 residence. This could lead to greater inequality in health, especially in families with low incomes and  
187 difficulties in accessing adequate food supplies[25,28,29]. This heterogeneity could be explained by  
188 its management by the autonomous communities and the absence of a sufficiently structured  
189 common regulatory framework. The predominance of the European Union funding of the SFVS over  
190 that received by the state suggests the existence of a disconnect between the actions carried out by  
191 both actors. The development and implementation of policies to promote healthy eating in schools  
192 requires integrated efforts from different sectors[9,11]. Despite the interest shown by the Spanish  
193 state in promoting a healthier diet through other initiatives such as the NAOS Strategy (Nutrition,  
194 Physical Activity and Prevention of Obesity)[39], the Perseo Program (Guide for an Active Healthy  
195 School) [40] or the THAO program (Prevention of childhood obesity based on actions in  
196 municipalities)[41], these initiatives been carried out in parallel with the SFVS and in a disjointed  
197 way.

198 The progressive increase in the quantities of fruits and vegetables provided in schools can favor  
199 the development of agricultural markets. Prioritizing the purchase of local, seasonal and organic  
200 foods would contribute to a more sustainable food system[42,43]. In addition, this would be in line  
201 with the recommendations of the European Commission to reverse the negative impact of the current  
202 food production system on the environment and society[44]. Despite this, our results show that the  
203 incorporation of these recommendations in the SFVS is still just beginning.

204 When interpreting these results, we must remember that the information used came from the  
205 annual strategies of the SFVS, prepared by the strategy managers in each AC. This can result in certain  
206 limitations due to the consistency of the information. However, these strategy documents present the  
207 information in a homogeneous way for the different school years studied, which allows us to explore

208 the how the SFVS is implemented in Spain. On the other hand, although this study focuses on a single  
 209 country (Spain) which makes it difficult to extrapolate and generalize results, the proposed  
 210 methodology allows us to describe the characteristics of the implementation and evolution of the  
 211 SFVS. This is the first study to explore the scope of the SFVS. Given that SFVS is an EU strategy, this  
 212 study can contribute to decision making to strengthen or introduce changes in the SFVS.

## 213 5. Conclusions

214 The development and scope of the SFVS in Spain is still insufficient to influence the dietary  
 215 pattern and the health of the school population. There are differences in implementation in the  
 216 different autonomous communities and the continuity of the program depends largely on the funds  
 217 coming from the EU. However, the program has generated a consumer market for agricultural  
 218 production. Taking into account the potential of the SFVS to improve children's food consumption  
 219 in line with sustainable development objectives, it is important to guarantee its implementation.  
 220 Increasing the Spanish portion of the budget and promoting synergies among the agents involved  
 221 could improve the coverage and duration of the SFVS, which would help promote sustainable food  
 222 systems.

223 **Author Contributions:** conceptualization, PS and IC.; methodology, PS and PC.; formal analysis, IC, MAMM  
 224 and PC.; investigation, IC and CA.; writing—original draft preparation, IC.; writing—review and editing, PS,  
 225 MCDB and PC; supervision, PS, MCDB and PC.

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