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Does organic school food service provide more healthy eating environments than their non organic counterparts?

Results from working package 5: Health and Nutrition

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English summary:

Organic food strategies are increasingly developing within European school food services at the same time as these services are being involved in measures aiming at promoting healthy eating at school and counter acting obesity. Schools have an important role to play in teaching children fundamental life skills, including good food habits according to a number of authoritative policy papers from Council of Europe, the WHO and the EU platform. Although there are great national differences, European school food culture seems to be in a transitional state in which both healthy eating as well as sustainable consumption strategies are contributing to shaping the future school food culture. It is therefore imperative to study how these changes in agendas influences each other and to study the associations between healthy eating and organic supply strategies at school.

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Table of Contents

Table of Contents	3
List of tables	5
List of figures	6
Preface.....	7
1. Introduction.....	8
2. Aim of working package.....	8
3. Methods.....	8
3.1 Study design.....	9
3.2 Web Based Questionnaire (WBQ).....	10
3.3 Survey in Germany	11
3.4 Survey in Finland	12
3.5 Survey in Italy.....	12
3.6 Data analysis	12
4. Results.....	13
4.1 Overall status.....	13
4.2 Germany.....	13
4.2.1 Decision maker of school food policy	14
4.2.2 Having a school-based nutrition board/group/committee.....	14
4.2.3 Restricting food items in school tuck shop	15
4.3 Finland	15
4.3.1 Decision maker of school food policy	16
4.3.2 Having a school-based nutrition board/group/committee.....	16
4.3.3 Restricting food items in school tuck shop	17
4.4 Italy	17
4.4.1 Decision maker of school food policy	18
4.4.2 Offering a school fruit scheme.....	18
4.4.3 Offering a school fruit provision.....	19

4.5 The comparative analysis among the schools in Germany, Finland and Italy.....	20
4.5.1 Having a food and nutrition policy	20
4.5.2 Involvement of nutrition knowledge in classroom curriculum	21
4.5.3 Having a school canteen	22
4.5.4 Enforcing nutritional recommendations.....	23
4.5.5 Operating nutritional calculated school menus	24
5. Discussion	25
6. Conclusion	27
References	28
List of deliverables from WP5	30

List of tables

Table 1. Overall respond status.....	13
Table 2. Organic/non organic schools status.. ..	13
Table 3. School food decision makers in Germany.. ..	14
Table 4. School food decision makers in Finland.....	15
Table 5. School food decision makers in Italy.....	17

List of figures

Figure 1. Flow sheet of survey.....	9
<i>Germany</i>	
Figure 2. Having a school nutrition board.. ..	14
Figure 3. Restricting competitive food in school tuck shop.. ..	15
<i>Finland</i>	
Figure 4. Having a school nutrition board.. ..	165
Figure 5. Restricting competitive food school tuck shop.....	16
<i>Italy</i>	
Figure 6. Offering a school fruit scheme.. ..	18
Figure 7. Offering a school fruit provision.. ..	189
<i>Comparative analysis among Germany, Finland and Italy</i>	
Figure 8. Having a food and nutrition policy.....	20
Figure 9. Involving nutrition knowledge.. ..	21
Figure 10. Having a school canteen.. ..	22
Figure 11. Enforcing nutritional recommendations.	23
Figure 12. Operating nutritional calculated school menus.. ..	24

Preface

Organic food strategies are increasingly developing within European school food services at the same time as these services are being involved in measures aiming at promoting healthy eating at school and counter acting obesity. Schools have an important role to play in teaching children fundamental life skills, including good food habits according to a number of authoritative policy papers from Council of Europe, the WHO and the EU platform. Although there are great national differences, European school food culture seems to be in a transitional state in which both healthy eating as well as sustainable consumption strategies are contributing to shaping the future school food culture. It is therefore imperative to study how these changes in agendas influences each other and to study the associations between healthy eating and organic supply strategies at school. This has been the point of departure for Working Package 5 (WP5): Nutrition and Health.

The WP5 study has included Denmark, Norway, Germany, Finland and Italy. The WP has been asking questions about the possible spin offs and ramification on nutrition and health that the emerging public organic food strategies might have had. The WP is a part of the project “innovative Public Organic food Procurement for Youth” (iPOPY) and the WP5 has been carried out by Aalborg University Denmark. The research presented here has been conducted in Germany, Finland, and Italy. The major part of the WP5 field research has been carried out with much enthusiasm by PhD student Chen He. In addition a number of trainees to which we are thankful have been participating: Stine Andersen, Anna Burkal, Mette Hansen and Malene Falster Olsen all have carried out sub tasks during the course of the project.

The member of the WP5 team wishes to express thanks to Carola Strassner, Melanie Lukas Minna Mikkola, Marco Valerio, Roberto Spigarolo and Anne Kristin Løes for their contributions to WP5. Also thanks to Nadja Milton for carefully looking into the statistics and to Line Mortensen and Mia Brandhøj for reviewing this manuscript.

Bent Egberg Mikkelsen

WP5 leader



1. Introduction

One of the most interesting perspectives of Public Organic food Procurement (POP) policies seems to be that the implementation appears to have the potential to induce changes in the food service environment that tend to be conducive for healthier eating. Since budgets in the cost sector catering in most cases are fixed in the public, menu planners, decision makers, public health nutritionists are often forced to involve “less meat more vegetable” strategies, which comply well with current nutritional advice. According to Torjusen et al (2004) health reasons are the number one reason for consumers to buy organic and according to Beckmann (2002) more important than concerns for environment and nature. Experience based data suggest that the introduction of organic foods induces a changed dietary pattern. O’Doherty et al (2001) suggests that heavy users of organic foods may have a lifestyle and dietary habits that simply comply more easily with recommendations.

This working report uses two important notions:

- Public Organic food Procurement (POP) policy refers to a policy, in which a particular amount of specified foods are expected to be organic, which are practiced in public organizations offering food.
- Food and Nutrition Policy (FNP) is a set of written and adopted principles that aims to fulfil nutritional needs of pupils at schools, and ensure availability and accessibility of healthy foods (He, 2008).

Evidence from Danish organic public procurement projects (DFFE, 2005) shows that POP policies often result in adoption of Food and Nutrition Policies (FNPs) at local institutions. Results from analysis of the German per-capita consumption (Brombacher & Hamm 1990) showed the per-capita-consumption of meat and meat products, of sweets and alcoholic beverages was much lower among heavy-users than of the average of the German population, and correspondingly the consumption of vegetables and cereals was much higher in that group. Mikkelsen et al (2007) showed that green worksite caterers serve more healthy meals than their non green counterparts. Thus it seems that healthy eating and organic consumption agenda have the potential to pull in the same direction, but although evidence suggest that green attitudes is associated with healthier serving practices and environment there is still a need to study in an evidence based manner the wider effect of organic procurement policy on eating behaviours

2. Aim of working package

The aim of WP5 has been to explore the relationship between organic food supply and healthy eating strategies at school and to get an insight in how central stakeholders at school perceive this relation. Based on these findings it has been the aim to study what effects organic procurement strategies and policies have on the eating patterns among young people at school using indicators of healthy eating practices. .

3. Methods

The study was structured in a preparatory single country pilot part and a multiple countries main part. The preparatory single country pilot part was carried out in Denmark. Firstly it involved a

qualitative study aiming at uncovering some of the attitudes and perceptions of *pupils and other central actors* towards organic foods in school were carried out. This was done in a Danish school using a single case in depth focus group methodology (Andersen et al 2010). Secondly it involved study of the structural conditions in three Danish municipalities all having food service as well as organic and healthy eating policies (He and Mikkelsen, 2009). Thirdly it involved a development of methodology for studying dietary behaviour among students in school food service environments (Hansen et al 2009).

The data from the preparatory part was used to inform the development of the Web Based Questionnaire (WBQ) that was used in the main part. In the main part a quantitative survey design was used. In this part the serving practices among school food coordinators that have engaged in organic vs. non organic procurement and policies were uncovered.

3.1 Study design

The study was conducted through a self-administrated quantitative web survey among school food coordinators in the public primary/secondary schools in three iPOPY participating countries, Germany, Finland and Italy. The school food coordinators in this study refer to school staff in charge of the school food service. In practice this person could be anyone from the school headmaster to a school food caterer. Due to ethical constraints the quantitative survey in Germany was limited to only one federal state.

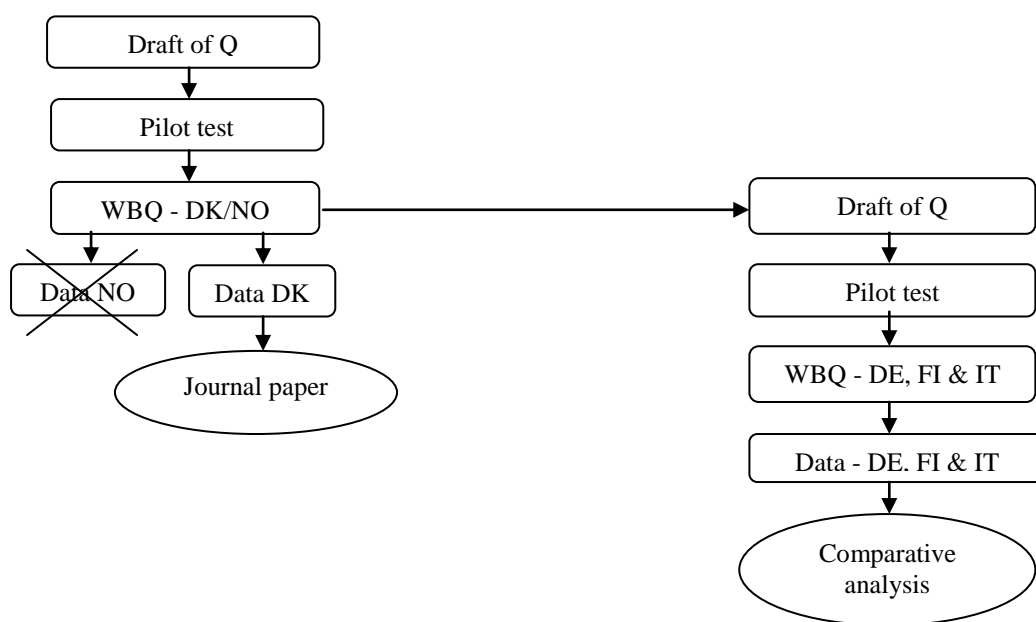


Figure 1. Flow sheet of survey. The figure shows the steps in the survey process in Denmark, Norway, Germany, Finland and Italy.

The current study used the questionnaire from the former research which was conducted in May 2008 among Danish/Norwegian public primary schools (Fig. 1). Due to structural differences in school food culture in Germany; Finland and Italy, the completed word questionnaire was after some modifications converted to a web based version and the final WBQ was made available for respondents through a web browser link. The final results will be presented as a comparative analysis.

Both Denmark and Norway were not included in the comparative study. The collected data from Danish/Norwegian schools were firstly analyzed and produced as a master thesis. Furthermore, the Danish data has been analyzed again and will be published as a scientific journal paper. The Norwegian cases were abandoned due to differences in school food service structure in the iPOPYP study countries. The Norwegian schools did not have a well developed school food service compared with the other iPOPYP countries, but only had fruit/milk subscription schemes (Løes et al 2008).

The observational cohort study was designed to measure whether the amount of organic food which was used in the school food service directly or indirectly correlated with the degree of supportiveness to healthy eating. The schools were divided into "organic schools" which had a policy regarding involving a certain amount of organic ingredients were used in school meals, and "non organic schools" where had no organic policy, using only conventional foods, based on information given about this in the questionnaires. However, it was not possible to recognise whether the schools in the sample were organic schools or non organic schools before the surveys were conducted.

3.2 Web Based Questionnaire (WBQ)

The content of questionnaire, or in other words, the measurements by the questionnaire is described as following:

WBQ sections	Section titles	Section contents
1	<i>Attitudes towards organic food and healthy eating.</i>	Mapping of attitudes of the school food coordinators concerning schools responsibility towards: -promoting organic foods through food serving, and through education -promoting healthy eating habits through food serving, and through education.
2	<i>Healthy eating policy</i>	Defining the term of "Food and nutrition policy" (FNP), followed by asking the school food coordinators: if the school had a FNP, for how long, who was responsible for the introduction of the FNP at the school (e.g. the municipality or the school administration), if the FNP did include any pedagogical activities, if the FNP included organic (purchase), if there was a nutritional group active at the school
3	<i>Other health issues</i>	Mapping to which degree the informants defined their school as health promoting, according to the WHO definition. Specific questions addressed cycling to school, school playgrounds and promotion of physical activity in breaks and in education additional to gymnastics. It was also asked whether the school participated in the Green Flag-program
4	<i>Organic food</i>	Mapping the school organic food policy. It was asked whether the

	<i>purchase policy</i>	school had a policy to purchase organic products, and if so, how long that policy had existed. Further, we asked who was responsible for the decision of organic food purchase, and whether it was mandatory or not for the school to purchase organic. Finally, we asked if there were any measures available to control if organic products were in fact purchased, and how the assessment of organic food purchase was conducted
5	<i>The school food system</i>	Addressed the school food system in practice. The school food coordinators were asked to tick whether the schools offered a fruit tuck shop/school fruit (subscription system), a milk subscription scheme, school tuck shop with food items or simple dishes for sale but no dining hall, or a school canteen with dining hall.
6	<i>Secular trends in food supply.</i>	Detailed mapping of how food offered in school had changed in recent years, e.g. if more or less fresh vegetables were offered now as compared to five years ago. The main reasons for such changes were also asked for, e.g. to cut costs or meet nutritional demands. The very last question asked whether such changes in the school food offers could be related to organic procurement. The school food coordinators were also invited to give additional personal comments if required

3.3 Survey in Germany

In Germany, there are ethically based limitations to handling out schools' contact information, and it was difficult to attract the interest of German federal states to participate in the study. In the state of Hesse this was finally made possible and WBQ link was inserted into the monthly school newsletter (called News: Schule und Gesundheit) made by Ministry of education and cultural affairs. This newsletter was sent out to all of schools in Hesse, totally 2050 schools. The WBQ was open around six months from 2nd November 2009 to 29th April 2010. However, the newsletters attached with the link of the WBQ and a short text about project were sent out only once in November 2009. To increase the response, the link was put on the website of the School Coordinator Centre in Hesse. Further, one reminder was prepared and was ready to send one month after sending WBQ by newsletter. The link to the WBQ was addressed again in the e-mail, and emphasized contain a small lotto inducement, i.e. an economy airfare round trip to visit a case of organic school in Denmark or Italy. This School Coordinator Centre tried to reach Ministry of education and cultural affairs again in order to send the reminder but this unfortunately failed in January as well as in February.

The survey was distributed to around 152 public primary and secondary schools in Hesse, Germany. The first respondent was on 4th of November 2009 and last one was on 3rd of March 2010. The food provision schemes in schools were unknown.

The questionnaire was translated into German and slightly changed to adapt to German conditions. The core content of the WBQ however was not changed. The WBQ was sent out to three experts in the field of school meals, one social worker, one person who involved in the planning of school meals and one consultant. The three experts read and commented on the WBQ. A pilot test of the questionnaire was carried out in one organic and one non-organic school in Germany. The sampling of pilot test was conducted by iPOP colleagues in Hesse.

3.4 Survey in Finland

The collection of Finnish school contacts was carried out with help from two nutrition researchers in Finland. One from South Savo Vocational College who offered 143 schools e-mail addresses. The other nutrition researcher was from Laurea Polytechnic who offered 855 school contacts. The school contacts were distributed over the country.

Four Finnish master students from Laurea Polytechnic used the data from the survey to complete their master thesis. They helped translate the WBQ, invitation letters and reminders. The main contents of the questionnaire were not changed. The selection of pilot test schools was decided by the nutrition researcher at Laurea Polytechnic. The questionnaire was tested at two schools. After some modifications, the final WBQ was produced.

The WBQ was distributed to 988 schools along with a briefly introduction regarding the survey. Two reminders were sent out one and two weeks after distribution. The questionnaire was open for around one month from 16th of November to 18th of December 2009. It should be noted that school food in Finland unlike Denmark and Germany is an integral part of the school food culture.

3.5 Survey in Italy

In Italy, the lists of school contacts were obtained from iPOPY partners in Milan. The selected schools were distributed in eight provinces: Bergamo (146 schools), Bologna (130 schools), Brescia (170 schools), Cremona (16 schools), Lecco (21 schools), Milano (268 schools), Pavia (72 schools) and Varese (117 schools). A total of 940 schools were selected but the food provision schemes in these schools were unknown. It should be noted that the tradition for publically provided school food in Italy is more advanced than in Denmark and Germany.

The translation of the questionnaire, distribution letter and three reminders were also conducted by our Italian iPOPY colleagues. As with the German and Finnish questionnaires, the key questions were not changed. A pilot test of the questionnaire was carried out in three primary schools in Milan. The teachers from these three schools involved in school food service supported the research. They gave feedback and iPOPY partners revised and produced the final questionnaire.

The WBQ was open two months from 2nd of December 2009 to 4th of February 2010. To increase the response three reminders were sent after sending the WBQ. The link to the WBQ was addressed again in the e-mail each time.

3.6 Data analysis

The data from the WBQs were captured in a database and analyzed in an electronic spreadsheet. Data were analyzed using the Statistic Package for the Social Science software package versions 17.0 (SPSS® inc., Chicago, IL, USA) and Microsoft Office Excel 2007. Descriptive statistics were used to characterize the study sample of schools. All P-values reported were two-tailed. The level of statistical significance was set at $P \leq 0.05$. Descriptive data were not normal distributed and the Mann-Whitney test was therefore repeated to apply and test the differences between the two types of schools. The main aim of the statistical analysis was to assess if significant differences were found between organic and non organic schools.

4. Results

4.1 Overall status

Table 1. Overall respond status. The table shows overview of respondent rate in Germany, Finland and Italy.

	Germany		Finland		Italy	
	Respondents	Percent	Respondents	Percent	Respondents	Percent
Complete	57	37,5%	205	20,5%	176	18,7%
Partially complete	65	42,8%	45	4,5%	39	4,2%
No responding	30	19,7%	748	74,9%	725	77,1%
Distributed	152	100,0%	998	100,0%	940	100,0%

Table 2. Organic/non organic schools status. The table shows overview of organic/non organic schools in Germany, Finland and Italy.

		Frequency			Percent			Valid Percent			Mean			Std. Deviation		
		DE	FI	IT	DE	FI	IT	DE	FI	IT	DE	FI	IT	DE	FI	IT
Valid	Organic schools	14	24	53	9,2	2,4	5,6	22,2	23,8	28,3	1,86	1,84	1,86	,535	,543	,635
	Non organic schools	44	69	108	28,9	6,9	9,4	69,8	68,3	57,8						
	Neither of them	5	8	26	3,3	,8	2,3	7,9	7,9	13,9						
	Total	63	101	187	41,4	10,1	16,2	100,0	100,0	100,0						
Missing	System	89	897	753	58,6	89,9	80,1									
	Total	152	998	940	100,0	100,0	100,0									

The overall status of respondent rate from three countries is shown in Table 1 whilst Table 2 describes the status of respondent organic/non organic schools. 57 out of 152 German schools, 205 out of 998 Finnish schools and 176 out of 940 Italian schools completed the questionnaire, whereas among the respondents, only 14 German schools, 24 Finnish schools and 53 Italian schools have indicated as organic schools. The data analysis included the school which partially completed the questionnaire. The respondent rate is in line with other findings from school based surveys and underlines the fact that schools are exposed with many different requests for surveys and that they as a result often are forced to prioritize. Thus the finding suggests that food and nutrition issues seem to have a quite low status in the school organization hierarchy.

On the other hand, it can be seen from Table 1 that most of German schools were partially completed the WBQ, while 74.9% Finnish schools and 77.1% Italian schools had no responding.

4.2 Germany

Table 3. School food decision makers. The table shows the decision makers responsible for adopting POP and FNP in German schools.

	Public Organic food Procurement policy	Food and Nutrition Policy
Germany	71% school itself	78% school itself
	29% school teachers	31% school teacher
	21% catering company	22% catering company

4.2.1 Decision maker and school food policy

Table 3 describes the type of decision makers that is responsible for the process of adopting the public organic food procurement policy and food and nutrition policy in German schools. In 71% of cases the organic school group adopted the POP policy themselves (school management) , in 29% of cases it was adopted by school teachers, and in 21% of cases by the catering company. Concerning the FNP, again, most schools adopted the policy at management level, in 31% of cases it was decided by school teachers and in 22% it was motivated by a catering company. However, it can be assumed that that the decision might have been negotiated among these actors in advance.

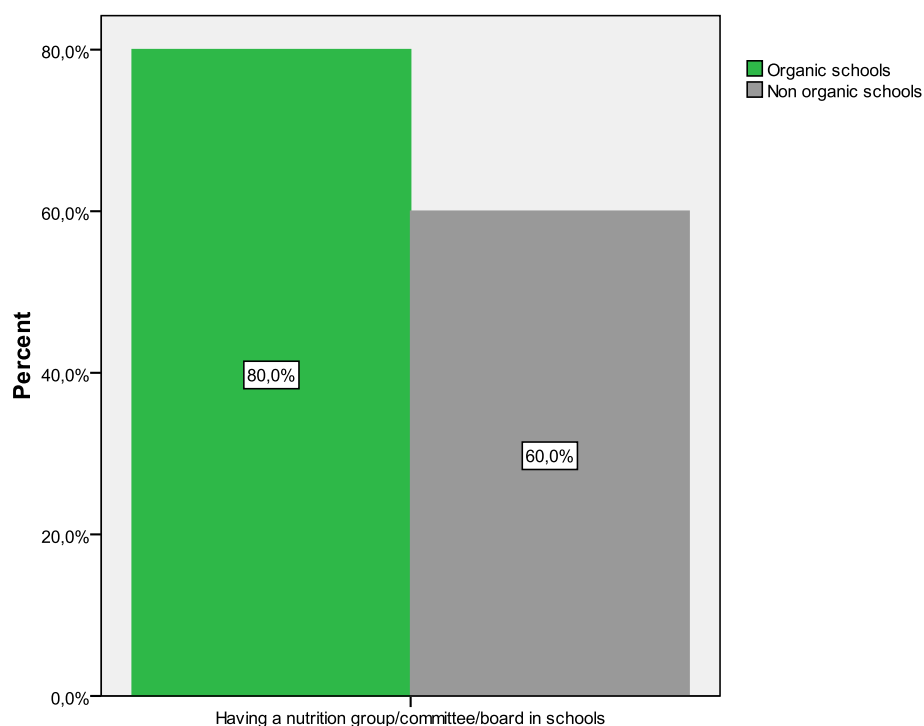


Figure 2. Having a school nutrition board. The figure shows the status of having a nutrition group/committee/board regarding school food service in German schools.

4.2.2 Having a school-based nutrition board/group/committee

In the questionnaire it was asked if the schools had a nutrition committee, nutrition group or nutrition board concerning food, health and nutrition of pupils in schools. Figure 2 illustrates there

were 80% of the German organic schools which had a nutrition committee or similar, while only 60% of the non organic schools had it. However, there was not statistically significant difference between the organic and non organic schools concerning whether or not they had a nutrition board in schools ($P=0.303$).

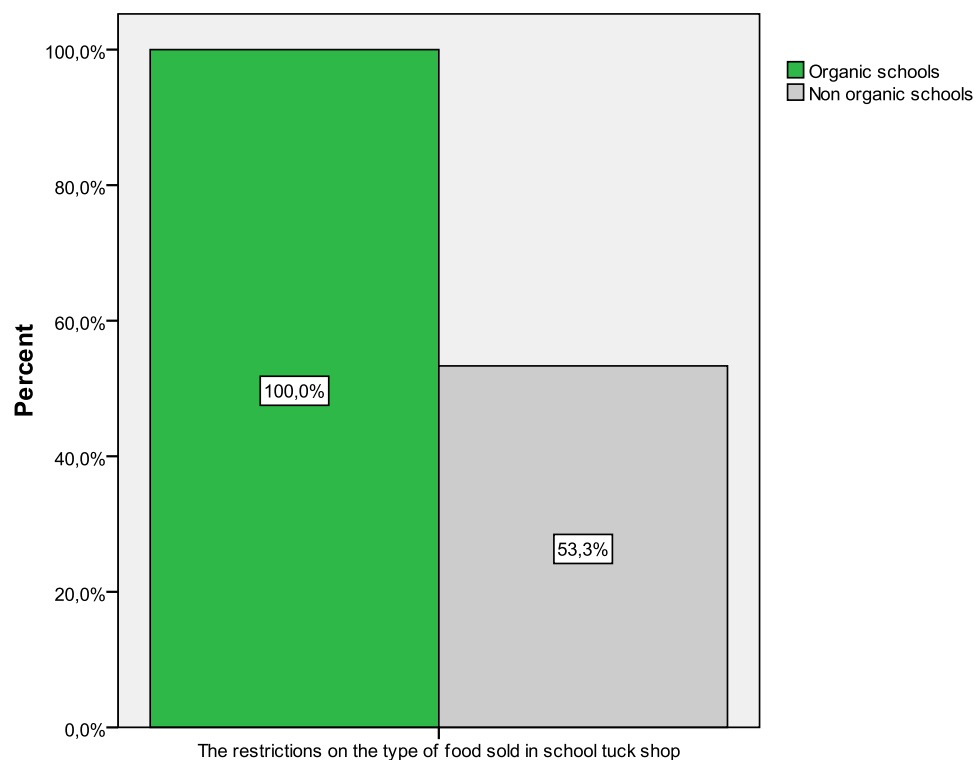


Figure 3. Restricting competitive food school tuck shop. The figure shows the restrictions concerning food items sold by tuck shop in German schools.

4.2.3 Restricting food items in school tuck shop

According to Figure 3, all fourteen German organic schools had restrictions in regard to the type of food items in school tuck shops, but only half of the non organic schools involved this restriction. Twice as many organic schools than non organic schools sold their food items to children in a school tuck shop. There was found statistically significant difference between the organic and non organic schools in regard to whether they involved the restrictions which provide healthier food items in school tuck shop ($P=0.046$). Furthermore there was found an association between being an organic school and having a nutrition board (Spearman's $\rho=0.447$, $P=0.042$).

4.3 Finland

Table 4. School food decision makers. The table shows the decision makers responsible for adopting POP and FNP in Finnish schools.

	Public Organic food Procurement policy	Food and Nutrition Policy
Finland	37% catering company	51% catering company
	35% school administration/kitchen	38% school administration/kitchen

	28% local or regional authority	23% local or regional authority
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4.3.1 Decision maker and school food policy

The type of decision makers in Finnish schools responsible for adopting the POP policy and FNP are quite different from the German schools. 37% of Finnish organic schools have adopted POP policy due to the sake of catering company. Another 35% organic schools established the organic policy by school administration or kitchen. There were also 28% schools by local authorities. Concerning the FNP, half of the schools have adopted FNP because of catering company. Thirty-eight per of schools adopted it based on their own wish by school administration or school kitchen, and 23% decided by local or regional authority. Regarding the food and nutrition policy, the adoption process might have been conducted by more than one decision makers.

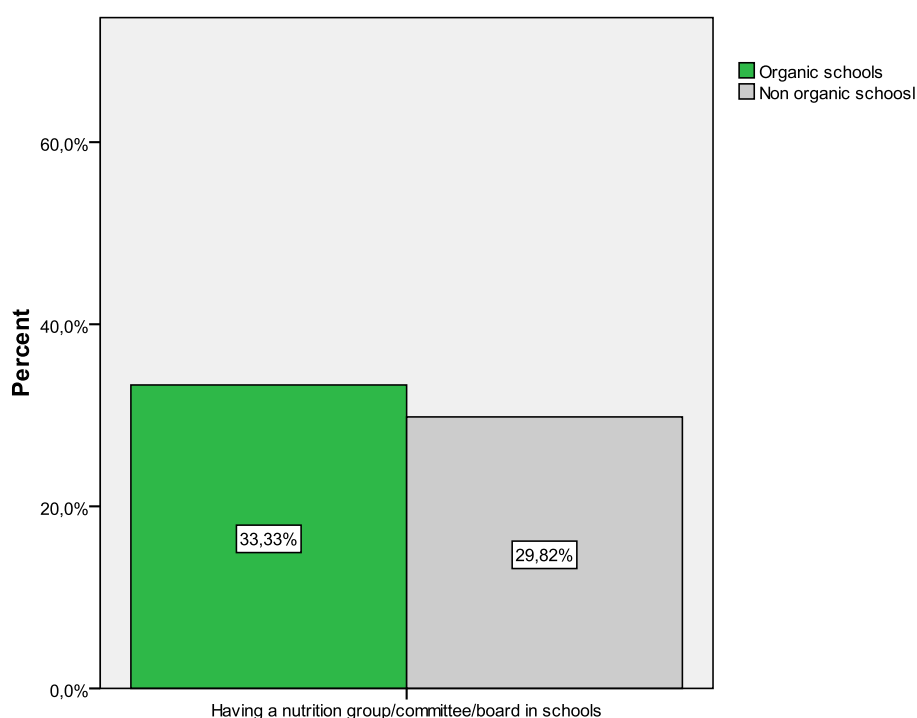


Figure 4. Having a school nutrition board. The figure shows the status of have a nutrition group/committee/board regarding school food service in Finnish schools.

4.3.2 Having a school-based nutrition board/group/committee

Figure 4 shows that the difference between the Finnish organic schools and the non organic schools was not obvious in relation to restrictions concerning the food items sold in school tuck shops. There were about 33% of the Finnish organic schools which had a nutrition committee or similar and almost 30% of the non organic schools had it. The difference however is minor and there is no statistically significant difference between the organic and non organic schools

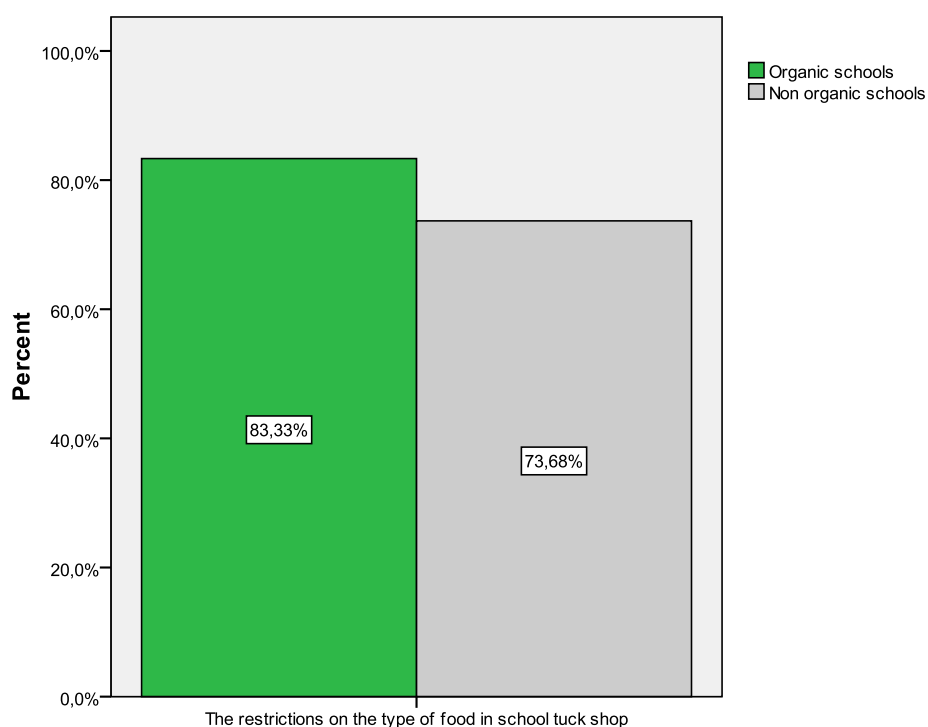


Figure 5. Restricting competitive food school tuck shop. The figure shows the restrictions concerning food items sold by tuck shop in Finnish schools.

4.3.3 Restricting food items in school tuck shop

From figure 5 we can see that nearly 83% Finnish organic schools had restrictions on the type of foods that could be sold in tuck shop, while 73% the non organic schools had such restrictions. Thus, the organic schools were 10% higher than the non organic schools about school tuck shop restriction. However, no significant difference has been found between the organic and non organic schools in regard to whether they involved the restrictions in order to promote healthier food for children ($P=0.733$).

4.4 Italy

Table 5. School food decision makers. The table shows the decision makers responsible for adopting POP and FNP in Italian schools.

	Public Organic food Procurement policy	Food and Nutrition Policy
Italy	72% local or regional authority	58% local or regional authority
	47% catering company	57% parents
	38% parents	50% health public surveillance authority

4.4.1 Decision maker and school food policy

Apart from German and Finnish cases, the Table 4 presented an overview of the main decision maker responsible for initiating the POP and FNP in Italian schools. In most cases (72%) it was local authorities that have initiated the organic school policy. In 47% of cases it was initiated by catering company and in 38% of cases it was initiated by parents. Concerning the food and nutrition policy, the situation was different from the case of organic policy. In 58% of cases the school FNP was adopted by local authorities, in 57% of cases by parents and in 50% of cases by health public surveillance authority. As described above in German and Finnish cases, the adoption process might however have been subject to previous negotiations between more of the stakeholders.

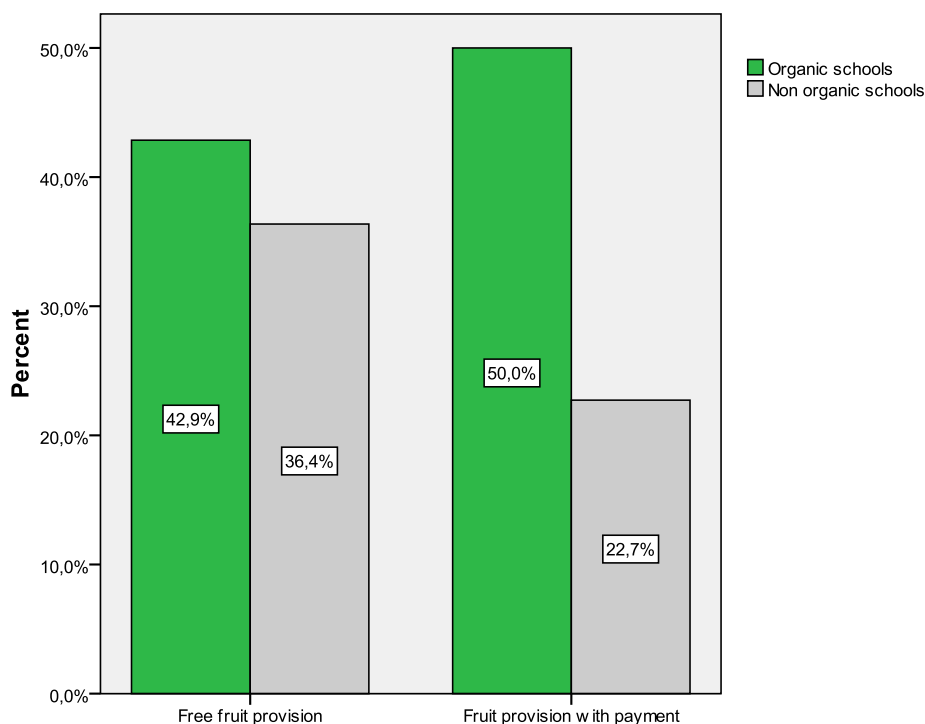


Figure 6. Offering a school fruit scheme. The figure shows the school fruit subscription scheme in Italian schools.

4.4.2 Offering a school fruit scheme

According to Figure 6 43% of the organic schools in Italian offer free fruit during the school time and 36% non organic schools offered free fruit. Thus, there were higher percentage organic schools which provided free fruit than non organic schools. On the other hand, 50% of the organic schools provide fruit but with payment, where the same situation for the non organic schools was only 22.7%. The rest of schools did not provide fruit for children. Overall, there were more organic schools which supply with either free fruit or paid fruit for children during school days than non organic schools. However, a statistically significant difference has not been found between the organic and non organic schools in regard to providing free/paid fruit ($P=0.174$) and there was not found any correlation between providing fruit for school children and having an organic policy.

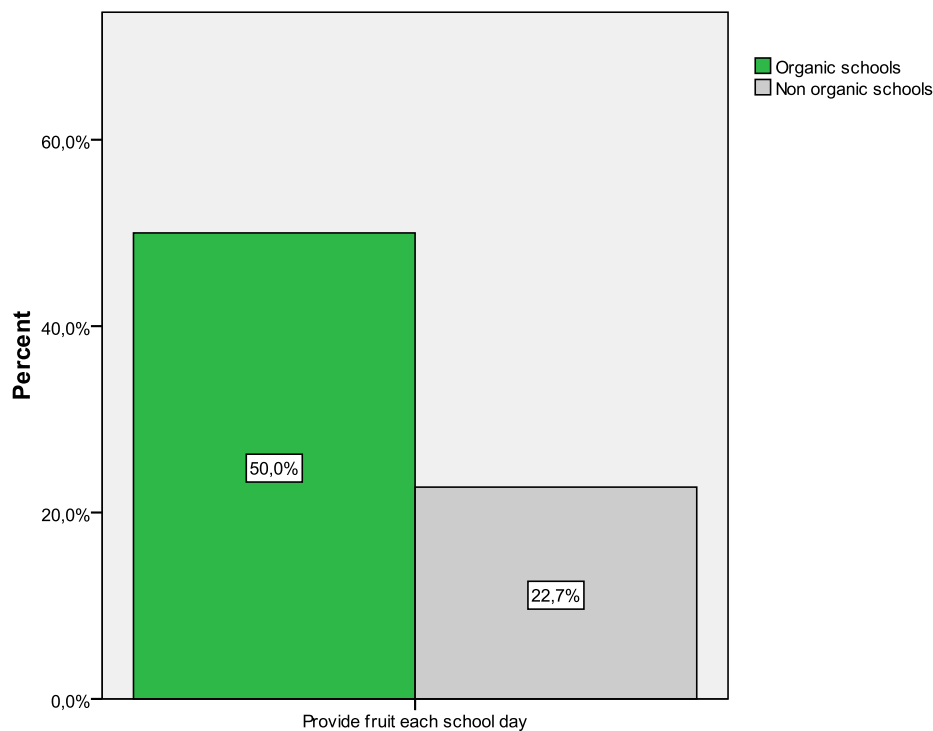


Figure 7. Offering a school fruit provision. The figure shows the frequency of school fruit provision in Italy.

4.4.3 Offering a school fruit provision

Figure 7 illustrates the frequency of fruit provision in the organic/non organic schools. 50% of the organic schools offered fruit in each school day and the other half did not offer fruit daily. For the non organic schools, there were 23% schools which supplied fruit for children every school day, and 68% did not. It can be concluded that there were twice as many organic schools that supplied fruit daily than the non organic schools. There was no statistically significant difference but towards a tendency to be significant between the organic and non organic schools concerning whether they offered fruit each school day ($P=0.064$). A correlation between adopting an organic food policy and providing fruit during each school day was found (Spearman's $\rho=0.394$, $P=0.013$).

4.5 The comparative analysis among the schools in Germany, Finland and Italy

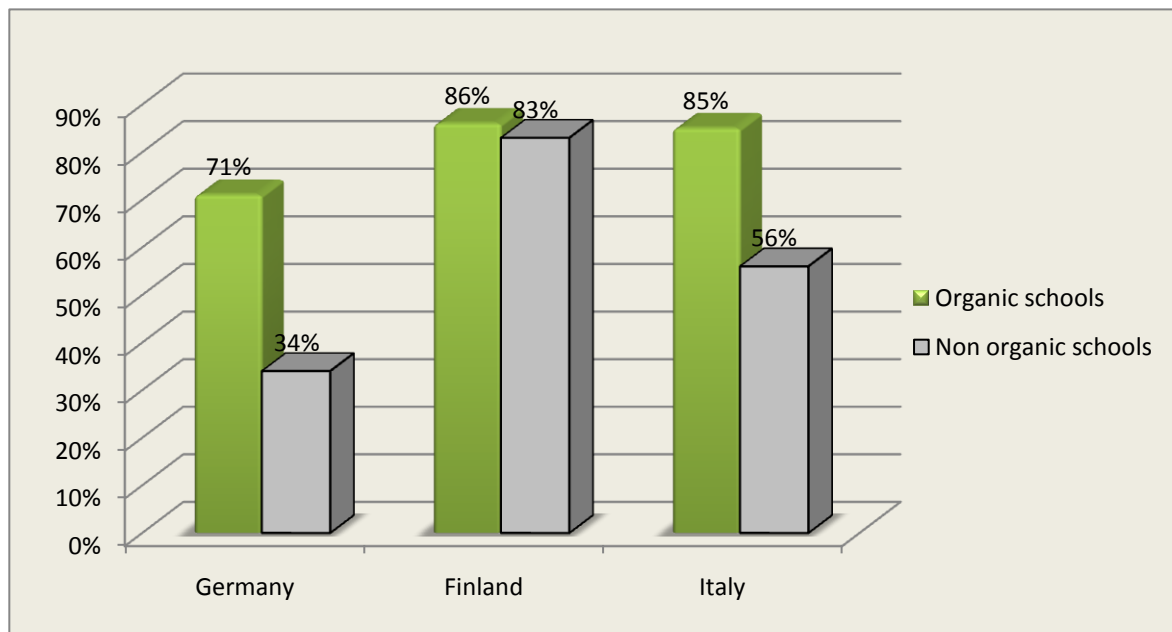


Figure 8. Having a food and nutrition policy. The figure shows the percentage of organic/non organic schools with the food and nutrition policy.

4.5.1 Having a food and nutrition policy

As shown in Figure 8, there were 71% German organic schools that had the food and nutrition policy for children, whereas only 34% non organic schools had it. In Finland, there was found almost no difference between the organic schools and the non organic schools concerning whether the schools adopted the FNP. Both types of schools seem to have high percentage, 86% for the organic schools and 83% for the non organic schools. Among the schools in Italy 85% of the organic schools had adopted the FNP while 56% for the non organic schools. Hence it was higher percentage in the Italian organic schools than the non organic schools. Therefore, the German schools seem to have the same status as the Italian schools regarding involving the food and nutrition policy in schools for children.

A statistically significant difference was found between the Italian organic and non organic schools for adopting the FNP ($P=0.001$). However, there were no statistically significant differences between the organic schools and the non organic schools in regard to have the FNP in Germany ($P=0.127$). Neither among the schools in Finland ($P=0.592$). There was only found correlation between the organic schools and having the FNP in Italy (Spearman's $\rho=0.225$, $P=0.002$).

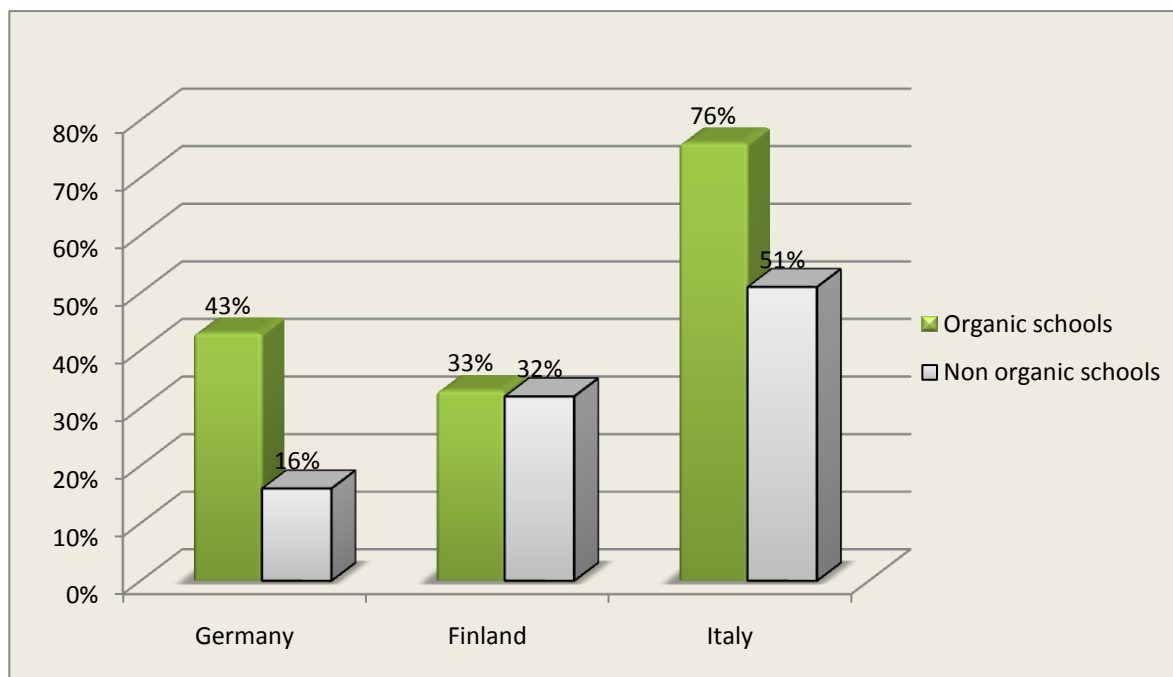


Figure 9. Involving nutrition knowledge. The figure shows the schools involved food and nutrition issues in teaching activities.

4.5.2 Involvement of nutrition knowledge in classroom curriculum

In this study, the schools respondents were asked whether the schools involved the FNP issues in their teaching activities. According to Figure 9, 43% of the German organic schools involved the FNP during curricular time, whilst only 16% of non organic schools involved it. However, there was no difference between the two types of school in Finland with regard to have teaching activities about the food and nutrition policy, 33% for the organic schools and 32% for the non organic schools. In Italy, the organic schools had higher percentage (76%) than the non organic schools (51%). From the overview of the chart it can be seen that the Italian organic schools have highest percent compared with the organic schools in Germany and Finland, or in other words, the organic schools in Italy have been most active in involving the FNP as part of curricular time.

However, there were no statistically significant differences between the organic schools and the non organic schools in regard to involve the FNP in teaching time in three countries (Germany: $P=0.392$; Finland: $P=0.939$; Italy: $P=0.656$).

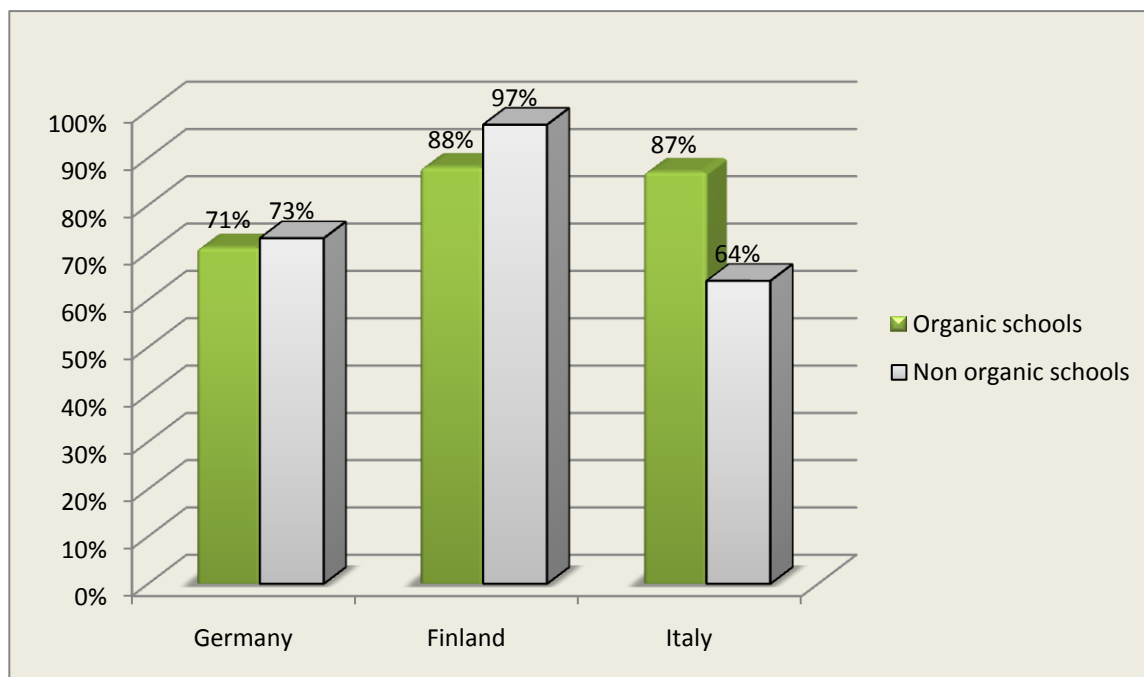


Figure 10. Having a school canteen. The figure shows the status of having a school canteen.

4.5.3 Having a school canteen

As it shown in Figure 10, both the organic school and the non organic schools in the three countries seems to have a school canteen, since all of them shows as high percentage. In Germany, the non organic schools were even higher than the organic schools concerning having a school canteen. The same situation also appeared in Finnish schools. The results indicated that nearly all non organic schools had a canteen while 88% of the organic schools had it. In Italy, 87% of the organic schools had a school canteen and 64% for the non organic schools. This is an exception in the study, since the non organic schools had the higher percent compares to the organic schools in Germany and Finland, even though the organic schools had high percent already.

Statistically significant difference was found between the Italian organic and non organic schools for having school canteen ($P=0.001$). However, there were no statistically significant differences between the organic schools and the non organic schools in regard to have school canteen in Germany ($P=0.925$). In the questionnaire, the Finnish respondents were asked if the school meals are prepared either on site or offsite. Therefore, the school meals prepared in the school kitchen showed no statistically significant difference between the organic schools and the non organic schools, in regard to have school canteen ($P=0.533$). On the other hand, the school meals which prepared at downtown site showed statistically significant difference between the organic schools and the non organic schools, in regard to have a school canteen ($P=0.010$).

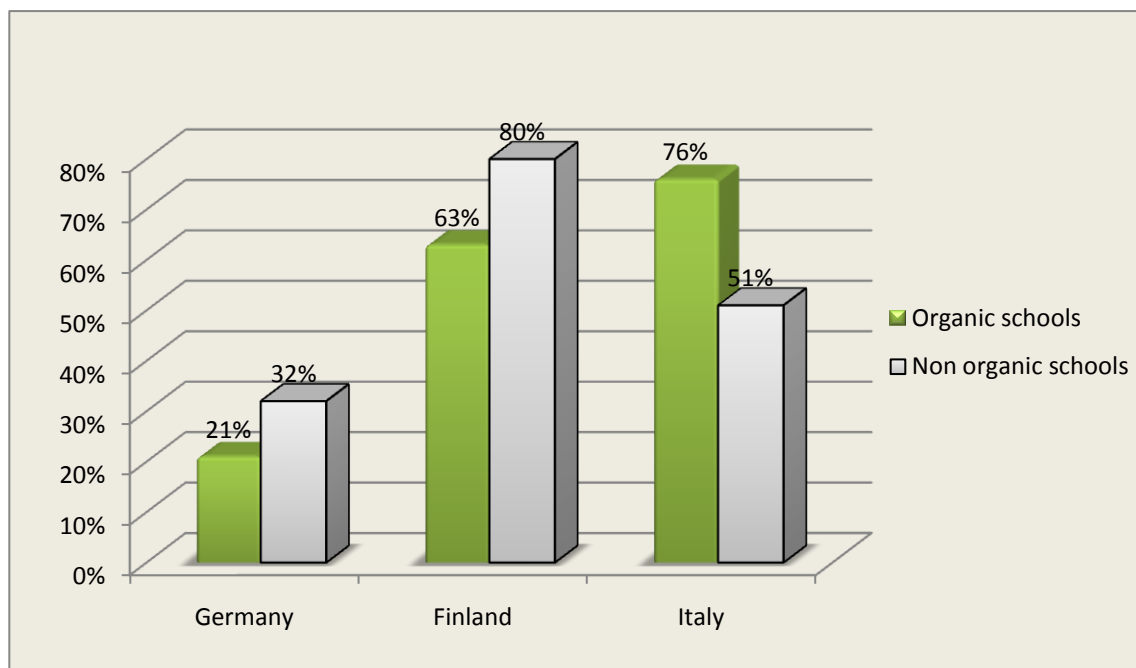


Figure 11. Enforcing nutritional recommendations. The figure shows the comparisons between the organic/non organic schools in regard to the issues of having nutritional recommendations for pupils.

4.5.4 Enforcing nutritional recommendations

According to Figure 11 21% of the German organic schools recommended their pupils to eat healthier and 32% for non organic school. The same tendency was found in Finnish schools. There were 63% of the organic schools while 80% of the non organic schools advised their pupils to eat healthier. Again, in this case the non organic schools behaved better than the organic schools in Germany and Finland. But among the Italian schools, the organic schools had higher percent (76%) than the non organic schools (51%) regarding recommending the children to eat healthier.

There were also no statistically significant differences between the organic and non organic schools regarding providing nutrition recommendations for children in all three countries (Germany: $P=0.403$; Finland: $P=0.101$; Italy: $P=0.575$).

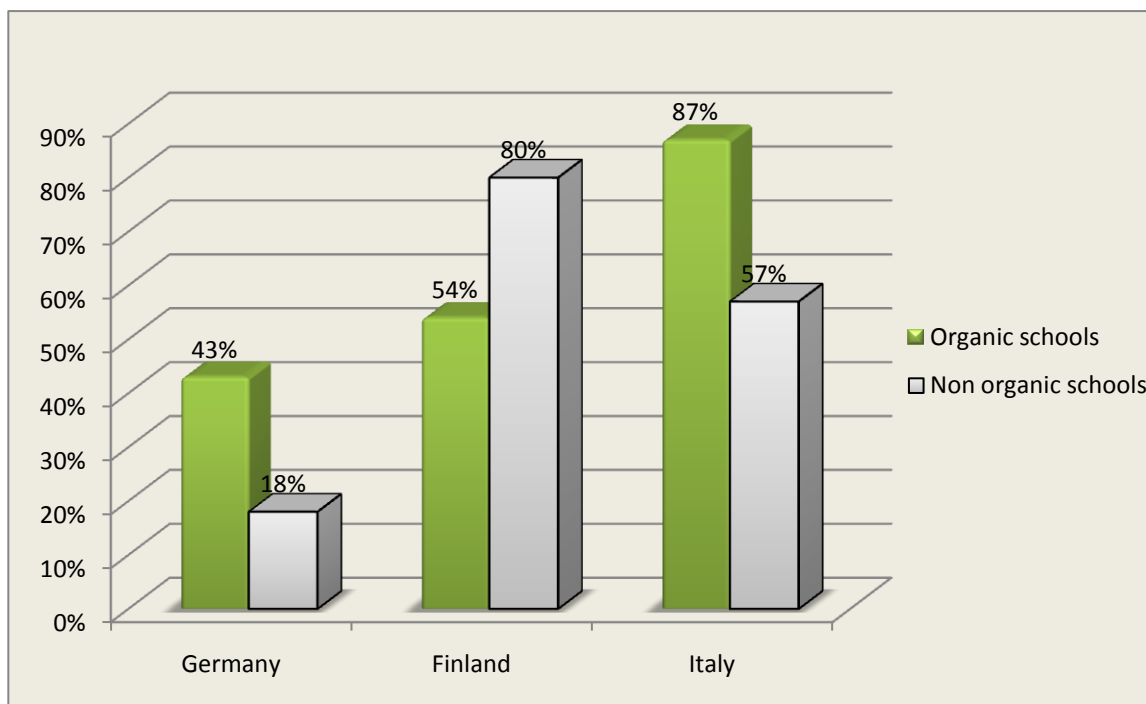


Figure 12. Operating nutritional calculated schools menus. The figure shows the comparison between organic schools and non organic schools with regard to the nutritionally calculated school meals.

4.5.5 Operating nutritional calculated school menus

As shown in Figure 12, in Germany there were 43% of the organic schools where school food menus were nutritionally calculated on a regular basis compared to the non organic schools, of only 18%. The positive results were also found among the Italian schools. 87% of the organic schools informed that the school meals were nutritionally calculated, while 57% for the non organic schools. However, in Finland the organic schools presented a lower percentage (54%) than the non organic schools (80%) concerning the nutritionally calculated foods for children. It seems that the Italian organic schools had the most positive results compared with the schools in Germany and Finland.

Statistically significant difference was found between the Finnish organic and non organic schools for nutritionally calculated school menus ($P=0.009$). There were no statistically significant differences in the organic and the non organic schools in Germany and Italy, but a tendency to be significant was found among German schools for nutritionally calculated school foods (Germany= 0.063 ; Finland: $P=0.133$).

The correlation was strongly showed in between the German organic schools and having nutritionally calculated school foods (Spearman's $\rho=0.461$, $P=0.001$).

5. Discussion

In Germany, the school food service is influenced by the transition to whole day school (ganztagschule). Traditionally the school day ends early in the afternoon, and the pupils go home for lunch. The German school system is currently going through a rapid change, with increasing the length of the school days. An increasing number of schools offer a mandatory whole day system (08:00-16:00), where food is included. Other schools have a voluntary system of childcare in the morning and afternoon. The pupils who stay longer in the afternoon can buy a hot meal, and some schools involve the pupils in preparing meals for other children under supervision of home economics teachers. In such cases, the food may become cheaper for the pupils to buy than when delivered by a catering company, and such school meal systems have become quite popular (Milotich, 1999). In this study, the results showed that 71% of the German organic schools had self adopted the organic policy, and 78% had self adopted the food and nutrition policy. The study considered that these schools had more motivation for promoting healthy school meals and eating habits among the children, than the schools which played a passive role in the policies adoption process.

Most German schools have tuck shops where pupils can buy food items such as milk, sandwiches and snacks. During the school day, there are several breaks (15-30 minutes) where food can be consumed (Milotich, 1999). The current data demonstrated that all the organic schools in this survey had responded that they established the restrictions concerning which food items could be sold in the school tuck shop, while only around half of the non organic schools had such restrictions. This indicated that the organic schools were more actively involved in providing healthy choices in school tuck shops than the non organic schools. The results furthermore showed that a higher percentage of the organic schools had a nutrition committee/group/board concerning health of pupils in schools compared to the non organic schools. From the German study it might be possible to conclude that the organic schools in Germany were more concerned about nutritional issues for children than the non organic schools.

Finland was the first country in the world to offer free school meals in 1948. By the national legislation, the schools are obligated to offer a free meal each school day. Meanwhile the municipalities have the responsibilities of monitoring and evaluating the school food (Finnish National Board of Education, 2008). Since Finnish schools have a long tradition to offer free healthy meal for pupils, it is of interest to find out whether they have involved organic foods in the school food service. The data showed that only 24 out of 205 respondent schools answered that they had adopted the POP policy. Among these organic schools, 37% of them adopted the policy due to catering company, and 35% by school administration. On the other hand, 51% of the respondent schools adopted the FNP because of the catering company. The Finnish schools had an obligation to offer free meals, and it seemed that the catering company could decide the involvement of organic food.

Having a school nutrition committee/group/board might provide more efficient circumstances for cooperation among school staff from school headmaster to kitchen manager. The results showed that both the organic and non organic schools had nearly the same percentage in regard to having a nutrition committee. This might be due to the fact that recommendations at national level have been around for many years in Finland. According to the Finnish National Board of Education (2008), around 30% of the Finnish schools served afternoon snacks. In this study, the data showed that 83% of the Finnish organic schools put restrictions on the type of foods sold in tuck shop, and 73% of the non organic schools. Both the organic and non organic schools had a high percent concerning

the type of snacks sold in tuck shops. This could be because of the work effort or effect from the National Board of Education. However, the organic schools had 10% higher than the non organic schools; in other words, the organic schools took more concern with the type of snacks sold in school tuck shop than the non organic schools.

In Italy, organic and local food is well integrated into school food service, and the school food system has mainly been the responsibility of the public (Morgan et al 2005). The results showed that 72% of the respondent Italian organic schools had adopted the POP policy because of the local or regional authority, and 58% of the respondent schools also adopted the FNP due to requirements from the local or regional authority. The results also showed also that for 57% of the respondent schools the food and nutrition policy was adopted by parents. It seems that Italian parents play an active role in the process of policy adoption or in school food service systems.

The results about school fruit scheme in Italy presented that almost all of the organic schools which offered fruit for children. There were more organic schools offering free fruit than the non organic schools. Besides, there were also more organic schools that provided paid fruit than the non organic schools. Among the organic schools, half provided fruits every school day and the other half did not. Compared to the non organic schools, only around 22% of the schools provided fruit in each school day and 68% did not. Therefore, the organic schools were more likely to have a school fruit scheme than the non organic schools; apart from this the organic schools were more willing to provide free fruit than the non organic schools.

The combined effects of the school food policies, the school food service, and curricular activities lead to influence eating behaviour of children, their confidences in choosing foods and their perceived support to consume healthier foods. The study showed that implementation of organic policies induces changes of the way which the school food service is performed. Also the study showed that the organic schools had praxis and provides an organisational environment that was more supportive for healthier eating than the non organic counterparts.

The data from three surveys demonstrated that the organic schools more frequently adopted and maintained the food and nutrition policy than non organic schools in all three countries, although the differences between the Finnish organic and non organic schools were not significant. The organic schools in Finland and Italy were most likely to adopt the FNP, whereas, the German organic schools might have more motivation for having the FNP compared to the non organic schools in Germany.

Engaging a food and nutrition policy during curriculum helps children to see relationships between health, diet and sustainability. The school unit is a potentially excellent platform to spread nutritional knowledge, since children attend school every day and consume at least one meal on school grounds. Integrating healthy food availability in schools into the curriculum is in line with the proceedings from the whole school approach and is believed to be influential on eating patterns and long term food and nutrition education of the individual. As results indicated, both the organic and non organic schools in Italy positively involved the food and nutrition policy as part of educational activity, compared with Germany and Finland. And the Italian organic schools acted as the most active role in relation to the German and Finnish organic schools, and the Finnish organic schools were least active. In Germany, the organic schools were much more likely to include the FNP during curricular time than the non organic schools. Again, some of the organic schools in Finland had been teaching the children about the FNP during the curricular time, the same situation as with the non organic schools.

Pupils can have a small social gathering when they are sitting in a school canteen. Children can also influence and learn from each other through eating lunch at the school. Perhaps more importantly the canteen is the place that provides opportunities for schools to promote health and wellbeing. Involving pupils in assisting or operating in the canteen might be more efficient to promote healthy eating habits among them. The children can then practice what they have learned during curricular time in a lively environment. The survey data showed that most of the respondent schools in three countries had a school canteen. The non organic schools were more likely to have a school canteen than the organic schools in Germany and Finland, even though the percent were quite minor for both countries. Only the cases in Italy were not out of the study expectation. The same unexpected trends among German and Finnish cases appeared again in regard to the issues of having nutritional recommendations for children in schools. The non organic schools in Germany and Finland recommended more active for children to eat healthier than the organic schools. The organic schools in Italy were through their enforcement of nutritional recommendations more active in encouraging pupils to take a healthy diet than the non organic schools. This could be due to the long tradition for public involvement in school food in Italy.

The school as a setting to support healthful food choices, serves children health and well being might has impacted more than larger units such as local community. Therefore, in the questionnaire, the schools respondent was asked whether the school meals were nutritionally calculated based on a regular basis. The results presented that the Italian organic schools were most actively involved in maintaining routines for nutritionally calculating school meals compared with the organic schools in Germany and Finland.

6. Conclusion

The results presented in this report provides some evidence on the fact that having an organic food procurement policy or strategy at school seem to have a positive influence on the “nutritional environment” at school. The results indicate that having and organic food procurement policy or strategy in most cases positively affect the awareness on nutrition and healthy eating issues. These results are encouraging because it suggests that the process of setting up a school food provision scheme based on organic principles work well together with the efforts to create a school food environment supportive of healthier eating patterns among young people. As such the results suggest that creating a raised awareness on food issues and a sensitive organizational environment at school could have positive impact on pupil’s health. The results are further encouraging since they support the fact that the connection that most people make between good nutrition and organic consumption seems to be reflected in actual school food environment. However it should be noted that, the quantitative part of the study had limited statistic power and a considerable dropout rate. Future research will need to investigate the impact of organic school food serving practices on children’s eating habits.

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List of deliverables from WP5

Conference presentations	Conference papers	Conference posters	Workshop/ conference proceedings	Working reports	Master thesis	Peer-reviewed papers
12	3	5	3	4	1	2

WP 5's deliverables - iPOPY						
Type	Title	Author	Remark	Time	Organic Eprint	
1. Conference presentation	Evidence on the effect of healthy and sustainable school meals system	Bent Egberg Mikkelsen	International Alimenterra Conference	November, 2007	http://orgprints.org/15840/1/15840.pdf	
2. Conference presentation	Public food systems strategies to protect environment, soil and groundwater - the case of organic food in Copenhagen	Bent Egberg Mikkelsen	Agua y Alimento Sostenible" 4 de julio-Expo Zaragoza	July 2008	http://orgprints.org/15771/1/15771.pdf	
3. Conference presentation	Learning and lifeskills through organic and healthy foods at school - The Scandinavian experience	Bent Egberg Mikkelsen	BioFach Latina Sao Paulo	October 2008	http://orgprints.org/15768/1/15768.pdf	
4. Conference presentation	Young peoples' voice on organic food and health in schools	Bent Egberg Mikkelsen	Open seminar of the iPOPY project in Helsinki	January, 2009	http://orgprints.org/15769/1/15769.pdf	
5. Conference presentation	Does organic food intervention in the Danish schools lead to change dietary patterns? - results of a web based questionnaire survey among Danish school food coordinators	Chen He & Bent Egberg Mikkelsen	Open seminar of the iPOPY project in Helsinki	January, 2009	http://orgprints.org/15770/1/15770.pdf	
6. Conference presentation	Organic foods in Danish municipal school food systems – a multistakeholder analysis of available evidence on constraints and perspectives	Bent Egberg Mikkelsen & Tenna Doktor Olsen	Foodprint	November, 2009	http://orgprints.org/16550/1/16550.pdf	
7. Conference presentation	An illustration of web survey methodology	Chen He	Foodprint	November, 2009	http://orgprints.org/16548/1/16548.pdf	
8. Conference presentation	Food, Football & Foodprints	Bent Egberg Mikkelsen	Biofach Germany –Brazilian Family farming seminar	February, 2010	http://orgprints.org/16801/	
9. Conference presentation	Organic and healthy – two goals in one go	Chen He & Bent Egberg Mikkelsen	Biofach Germany	February, 2010	http://orgprints.org/cgi/users/home?screen=EPrint%3A%3AView&eprintid=16802&action_null.x=17&action_null.y=10&action_null=View+Item	
10. Conference presentation	Nutritional implications of organic conversion in large scale food service	Bent Egberg Mikkelsen & Chen He	Foods for Health Institute (FFHI), UC Davis	June, 2010	http://orgprints.org/17324/	

			Centre for Advanced Food Studies (LMC)		
11. Conference presentation	Promoting sustainable consumption and healthy eating: A comparative study among public schools in Denmark, Germany, Finland & Italy	Chen He & Bent Egberg Mikkelsen	Linking Health, Equity & Sustainability in Schools, CICG, Geneva,	July, 2010	http://orgprints.org/17325/
12. Conference presentation	Økologisk mat i danske skoler – et bidrag til sundere skolemåltider?	Bent Egberg Mikkelsen & Chen He	Konferanse: Økologisk mat til ungdommen, Norges Forskningsråd, Oslo	September, 2010	Will be uploaded in Organic Eprint
13. Conference paper	Organic foods in Danish municipal school food systems – a multistakeholder analysis of available evidence on constraints and perspectives	Bent Egberg Mikkelsen & Tenna Doktor Olsen	Foodprint	November, 2009	http://orgprints.org/16702/1/Organic foods in Danish municipal school food systems.pdf
14. Conference paper	An illustration of web survey methodology	Chen He	Foodprint	November, 2009	http://orgprints.org/16548/2/16548paper.pdf
15. Conference paper	Organic and healthy – two goals in one go	Chen He & Bent Egberg Mikkelsen	Biofach Germany	February, 2010	http://orgprints.org/16802/2/COR E_Proc BioFach 2010 ipopy V F_CH_BEM.pdf
16. Conference poster	Organic school meals in three Danish municipalities	Chen He	IFOAM, Modena	May, 2008	http://orgprints.org/14060/1/14060.pdf
17. Conference poster	Does organic food intervention in school lead to change dietary patterns?	Chen He & Bent Egberg Mikkelsen	IFOAM, Modena	May, 2008	http://orgprints.org/14062/1/14062.pdf
18. Conference poster	Health policy intervention in schools promote physical activity among the pupils	Chen He & Bent Egberg Mikkelsen	ISBNPA	June, 2009	http://orgprints.org/15841/1/15841.pdf
19. Conference poster	Organic and healthy food strategies in schools-Separate strategies or two sides of the same coin?	Chen He	Food Denmark PhD Congress	November, 2009	http://orgprints.org/17130/
20. Conference poster	An illustration of web survey methodology	Chen He	Foodprint	November, 2009	http://orgprints.org/16549/1/16549.pdf
21. Workshop proceeding	The iPOP Young Researchers Workshop on Organic and Healthy Foods in Schools - Methods and Early Results	Chen He, Elin Marley & Bent Egberg Mikkelsen	The iPOP Young Researchers Workshop on DTU	April, 2008	http://orgprints.org/15648/1/15648.pdf
22. Conference proceeding	Joint Actions on Climate Change	Bent Egberg Mikkelsen, Sofie Husby & Mia Brandhøj	Aalborg Congress & Culture Centre, Denmark	June, 2009	http://orgprints.org/16799/1/Joint actions in core FINAL100210.pdf

23. Conference proceeding	Novel Strategies for Climate Mitigation, Sustainability and Healthy Eating in Public Foodscapes	Mikkelsen, BE; He, C; Mikkola, M Nielsen, T & Nymoen, L	Foodprint	November, 2009	http://orgprints.org/16798/1/FoodPrint%2709_Proceedings.pdf
24. Working report	Organic school meals in three Danish municipalities	Chen He & Bent Egberg Mikkelsen	Published in Bioforsk	February, 2009	http://orgprints.org/15849/1/15849.pdf
25. Working report	Design & pilot testing of a dietary assessment methodology for children	Mette Hansen, Rikke Pilman Laursen & Bent Egberg Mikkelsen	Published in Bioforsk	April, 2009	http://orgprints.org/16800/1/20091120_Hansen_et_al_2009_Design_and_pilot_testing_of_a_dietary_assessment_methodology.pdf
26. Working report	Pupil Conception of Organic Foods and Healthy Eating at Schools	Stine Andersen, Anna Burkal, Malene Falster Olsen, Bent Egberg Mikkelsen	Published in Bioforsk	January, 2010	http://orgprints.org/17169/
27. Working report	Does organic school food service provide more healthy eating environments than their non organic counterparts? – a comparative survey study in Germany, Finland and Italy	Chen He & Bent Egberg Mikkelsen	Will be published in Aalborg University Denmark report series	June, 2010	Will be uploaded in Organic Eprint
28. Master thesis	Does organic food intervention in school lead to change dietary patterns?	Chen He	Technical University of Denmark	September, 2008	http://orgprints.org/14573/1/Thesis_final_version-Chen_He.pdf
29. Peer reviewed paper	Organic school food policies are supportive for healthier eating behaviours– results from an observational study in Danish schools	Chen He & Bent Egberg Mikkelsen	Done and submitted to BFJ	August, 2010	http://orgprints.org/17422/
30. Peer reviewed paper	Does organic school food service provide more healthy eating environments than their non organic counterparts? – a comparative survey study in Germany, Finland and Italy	Chen He & Bent Egberg Mikkelsen	Ongoing	To be confirmed	Will be uploaded in Organic Eprint