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Health | Equity | Environment

Cost-Benefit Analysis: Sustainable food for public schools in Madrid

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Overview

Madrid cityhall as part of the Milan agreement launched an intervention in 56 kindergardens schools (0-3 years old)
INHERIT project contributes with workshops oriented to schools comunity in order to improve awareness and acceptability
New menus are being generated in the schools with the supervision of nutritionists
Regulation on the cantinas provisioners is changed to generate more sustainable habits

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Objectives: triple win

- Introduction of ecological products (at least 2 per year)
- Less intermediaries in the food provision (not more than 2)
- Introduction of healthy habits (eg reduction of meat consumption, seasonal fruits, reduction of sugar, etc)
- Work on acceptability of the menus (children—cooks courses for tasty recipes; parents—more nutritional information to families)

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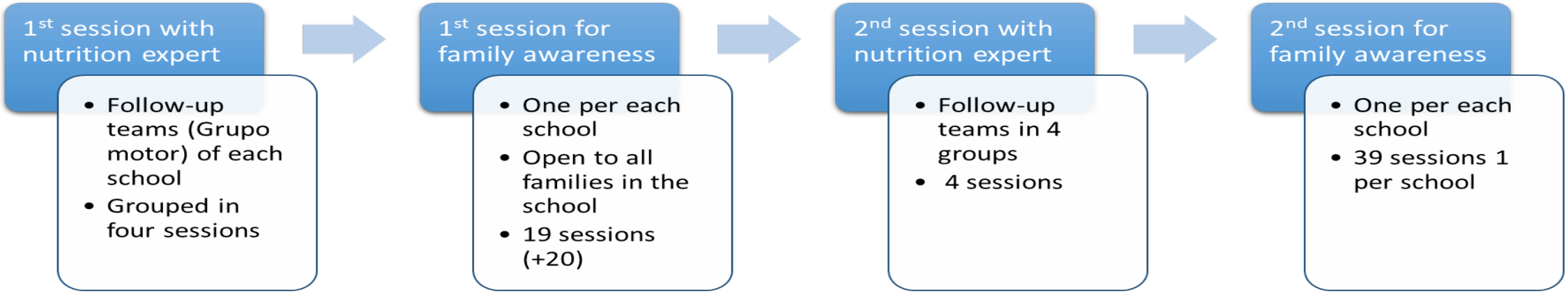
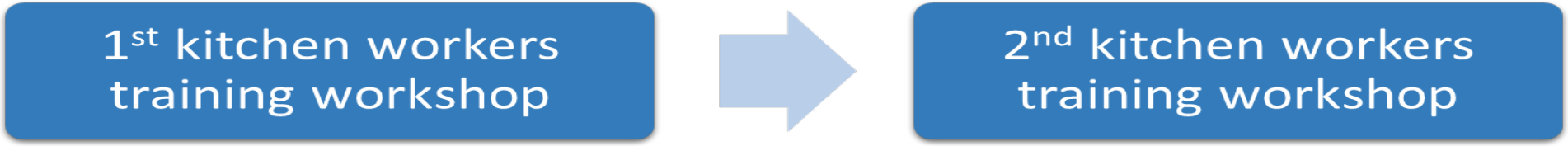
Implementation process

Parental awareness rising activities



School kitchen staff training activities



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Cooks in the middle of the

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Some intervention measures

Some interventions	General effect	School community differences	Location differences
Introduction of ecologic food	z = -0.24	χ2(5) = 26.66***	χ2(20) = 19.46
Introduction of fair trade products	z = -2.20**	χ2(5) = 9.26*	χ2(20) = 26.16
Substitution of animal to vegetal protein one day a week in the menu	z = 0.55	χ2(5) = 11.26**	χ2(20) = 27.31
Elimination of fish such as sway, tilapia or Nile perch	z = 1.96**	χ2(5) = 19.35***	χ2(20) = 24.91
Maximum of two the number of intermediaries between school diners and producers or farmers	z = -0.45	χ2(5) = 23.27***	χ2(20) = 21.47
Elimination of food precooked or prepared by other industries or businesses in school diners	z = 1.79*	χ2(5) = 38.60***	χ2(20) = 22.16
Use of non-prepared food items as kitchen ingredients	z = 2.32**	χ2(5) = 29.43***	χ2(20) = 25.90
Four days with fruit servings as dessert	z = 0.22	χ2(5) = 8.15	χ2(20) = 19.04
Serving natural dairy products, without edulcorates, flavouring or artificial colouring	z = 1.85*	χ2(5) = 8.52	χ2(20)=38.64***
Elimination of fruit juices not prepared in the school	z = 1.67*	χ2(5) = 33.63***	χ2(20)=37.06**
Compulsory use of extra virgin olive oil	z = -0.05	χ2(5) = 16.96***	χ2(20) = 19.09
Introduction of goat milk and cheese	z = -0.70	χ2(5) = 12.35**	χ2(20)=36.55**
Introduction of integral products (cereals, pasta...)	z = 0.85	χ2(5) =25.28**	χ2(20) =25.64

Heckman estimation from literature

	Outcome equation			Selection equation		
	Health Risk Reduction			Probability that HRR significant		
Variables	Coef	Std. Err.		Coef	Std. Err.	
Health type: General health	35.760	(7.027)	***			
Health type: Cardiovascular	6.022	(2.850)	**			
Health type: Obesity	12.813	(5.890)	**			
Health type: Other	34.707	(4.431)	***			
High impact interventions	1.015	(5.923)				
Fruits & vegetables	22.367	(11.038)	**	0.204	(0.321)	
Sweets and soft drinks, fast food, etc.	19.940	(11.516)	*	1.693	(0.622)	***
Nutritional education	59.268	(13.201)	***	-0.809	(0.611)	
Age: 0-3	23.163	(19.396)				
Age: 4-14	-3.641	(9.724)				
Constant	-21.64	(12.609)	*	-0.473	(0.280)	*
Wald test global significance chi2(10)		623.040	***			
Wald test of (rho = 0): chi2(1)		2.650	*			

108 observations of reported reduction on nutrition based health risk reduction on obesity, BMI, cardiovascular, etc.

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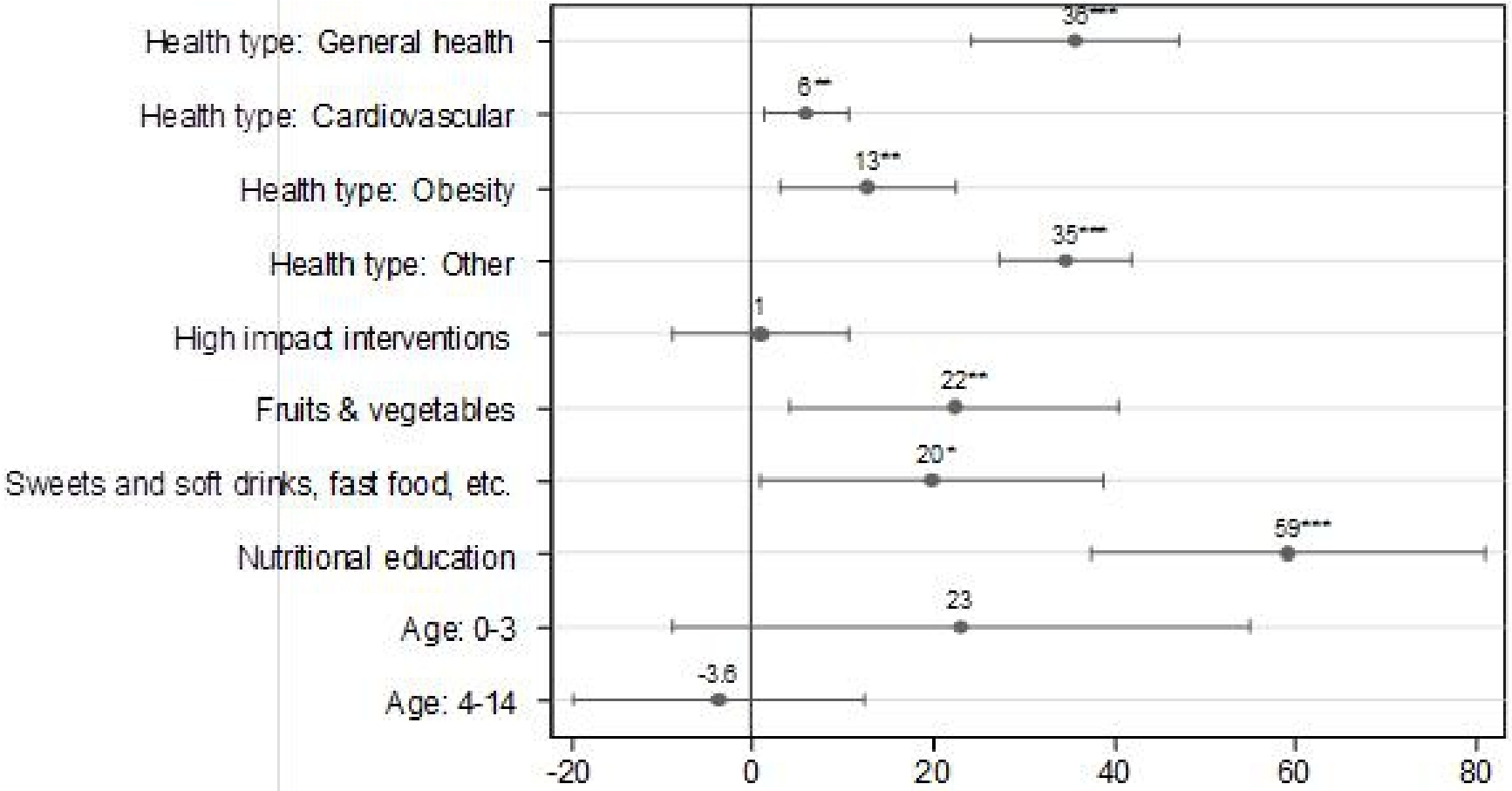
Marginal effects of the intervention (literature



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Intervention changes inform CBA calibration (3 schools baseline vs new menus)

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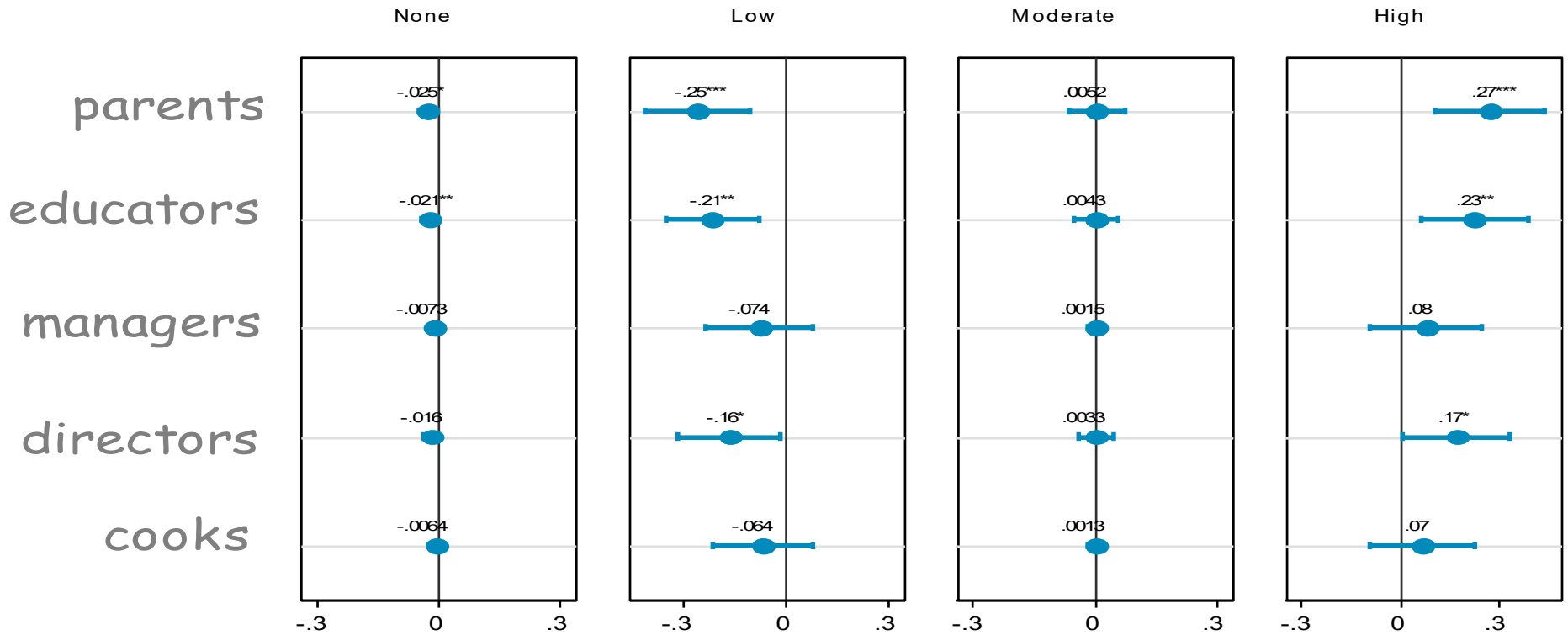
Everyday SEASONAL FRUIT IN THE MORNING and AFTER LUNCH, INTEGRAL BREAD LEGUMES AND extra virgen OLIVE OIL are ECOLOGIC

MONDAY		TUESDAY		WEDNESDAY		THURSDAY		FRIDAY	
								1	Rice with chicken and vegetables Fruit
4	Fish Fideua with peas, carrot and green beans Natural Yogurt	5	Lentils with rice and vegetables Fruit	6	Cabbage with potatoes and carrot Salmon with salad Fruit	7	Hake stewed with potatoes and vegetables Fruit	8	Rice with homemade tomato Omelette with lombarda Fruit
11	Vegetables puree Sardines in oil and tomato salad Fruit	12	Romanescu salted with jam and peas Natural Yogurt	13	Meatballs with peas, carrot and potatoes Fruit	14	Breast chicken with vegetables Fruit	15	Pumpkin puree Hake with salad Fruit
18	Pasta with homemade sauce (tomato, vegetables and meat) Natural Yogurt	19	Chickpeas stewed with leeks, carrots, potatoes and rice. Fruit	20	Green beans with potatoes Baked chicken fillet with apple Fruit	21	Lentils with rice and vegetables Fruit	22	Mashed potatoes, leeks and carrots Baked hake Fruit
25	Fish Fideua with peas, carrot and onion Fruit	26	Lentils with rice and vegetables Fruit	27	Vegetables puree Chicken fillet breaded with broccoli Fruit	28	Spanish soup (stewed with vegetables) Natural Yogurt		

Survey based information

Implementing some of these measures will promote dietary changes in families outside of school? (Filtering the effects through parents awareness)



Monetary cost of obesity and overweight (not

Reference	Country and Year(s)	Type	Annual per capita costs (€)
Von Lengerke et al, 2010	Germany, 2000	BMI	498.77
Konnopka et al, 2011	Germany, 2000	Obesity	10.29
Hogaard et al, 2008	Denmark, 1996-2004	Obesity	608.95
Vellinga et al, 2008	Ireland, 1997-2004	Obesity/ Overweight	1.59
Veiga, 2008	Portugal; 1995-96, 97-98	BMI	34.73
Knoll and Hauner, 2008	Germany, 2003	BMI	127.46
Worre-Jensen et al, 2007	Denmark, 2003	BMI	20.47
Emery et al, 2007	France, 2002	Obesity	65.00
Folman et al, 2007	Denmark, 1996-99	BMI	653.08

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Percent changes in expenditure 2017/18-

Period	Year	Fruits & veg	Dairy	Rice & pasta	Legumes	Olive oil	Bread	Meat & fish	Frozen & processed
September	2017/19	15%	14%	-28%	-2%	202%	0%	-13%	9%
October	2017/19	75%	2%	-4%	92%	-	-1%	50%	-
November	2017/19	42%	-25%	-46%	-25%	-	-3%	15%	-19%
December	2017/19	137%	-32%	75%	-	-	-1%	-31%	-28%
January	2017/19	324%	140%	-19%	-	-	-4%	14%	-81%
Sep-Jan	2017/19	96%	5%	-17%	5%	4%	-2%	7%	-11%

- Carbon changes and footprint were calculated from the consumption patterns changes reported by the school menus
- Following the common methodology for the CBA a value of 0.0078€ per CO_2 equivalent Kg was used.

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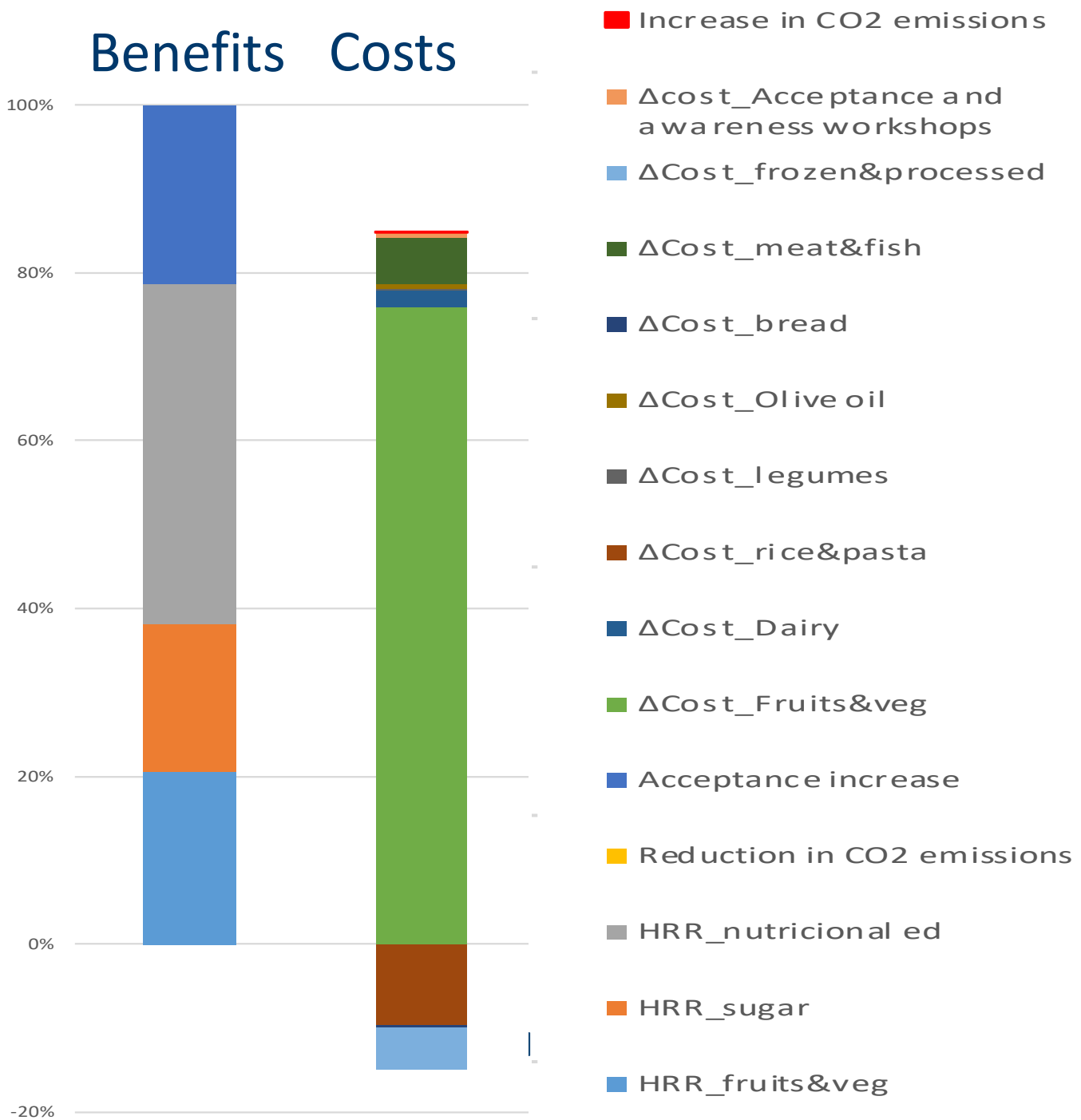
Percentage of annual contribution to Benefits and Costs



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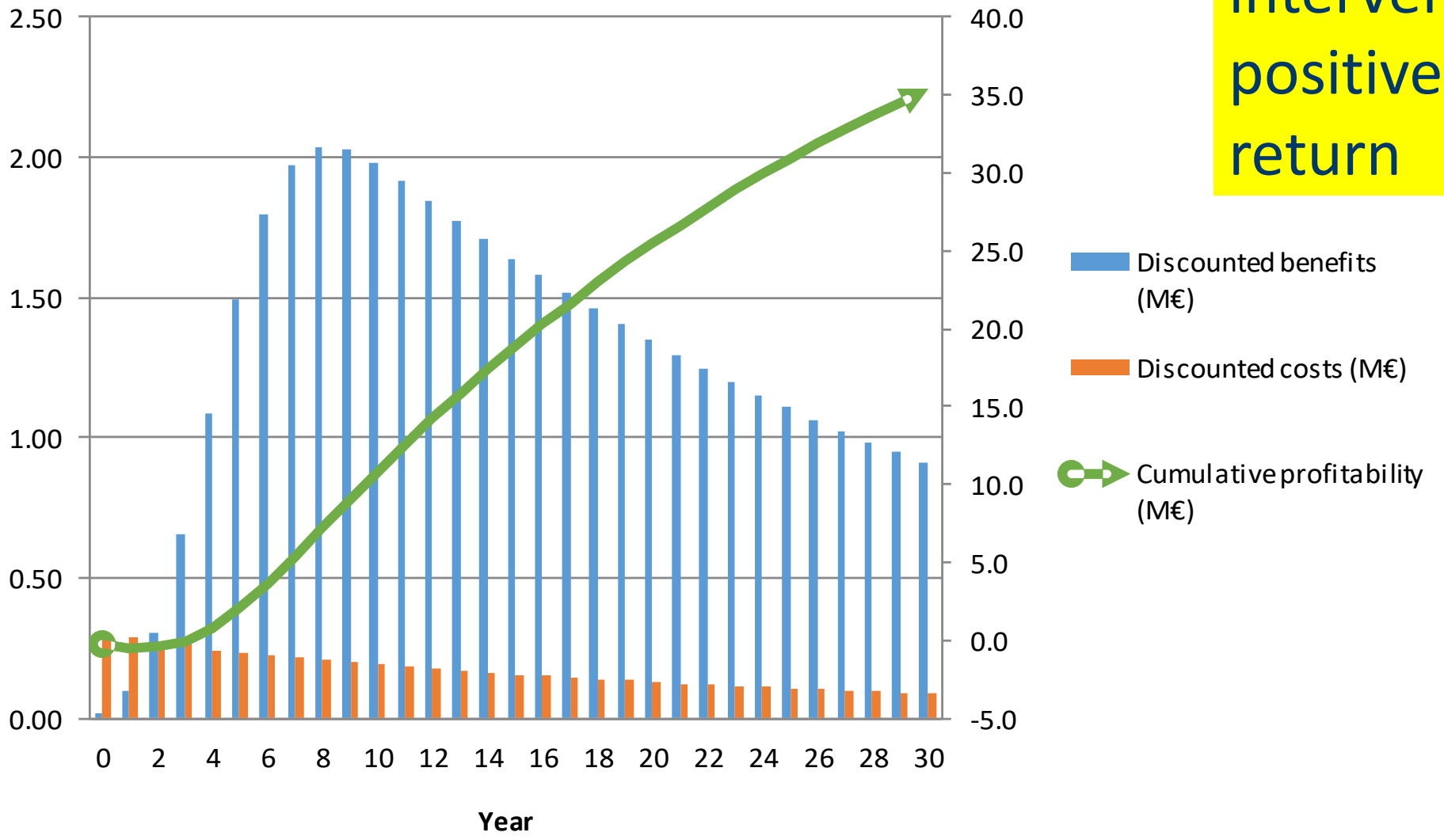
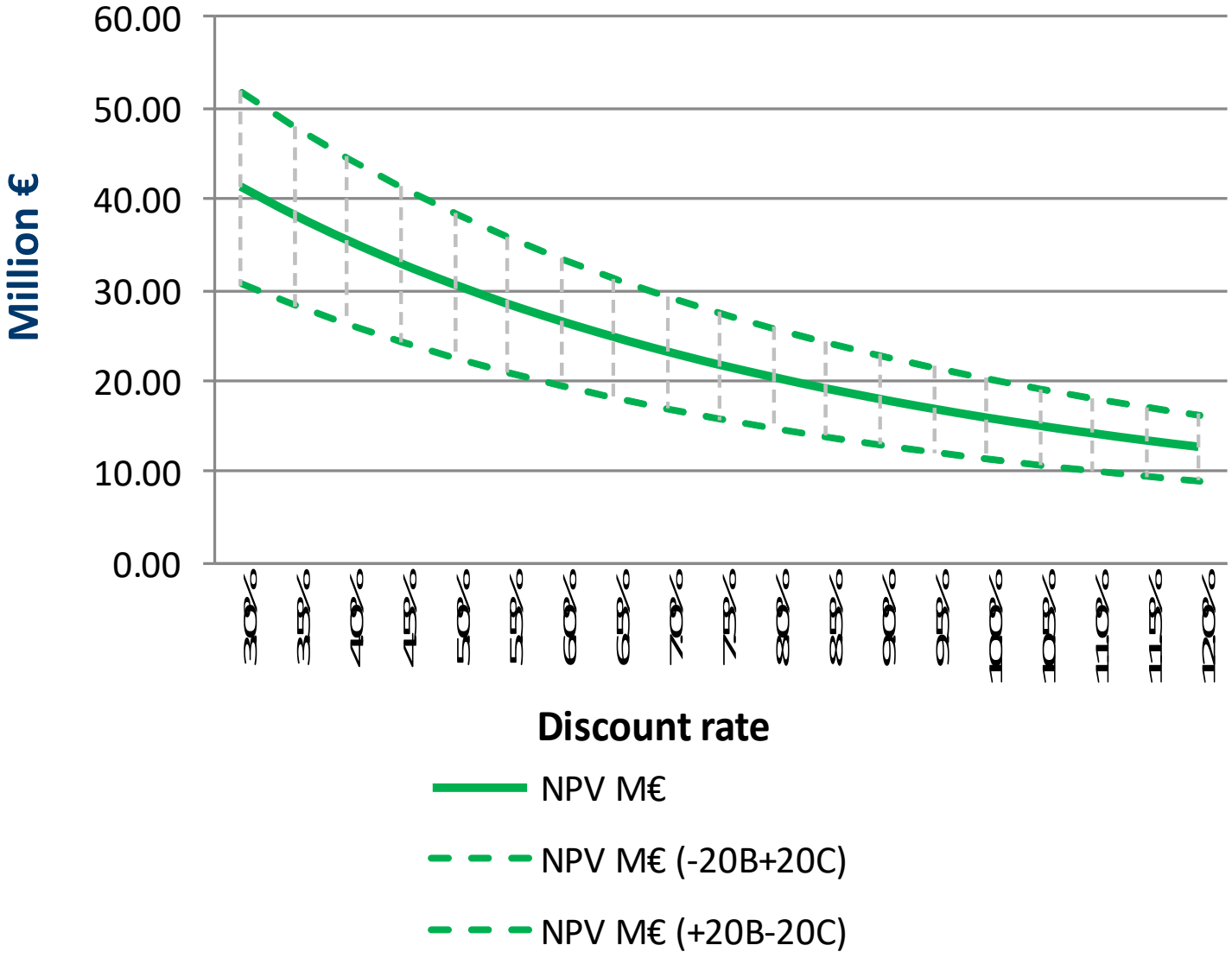
CBA: Discounted benefits and costs

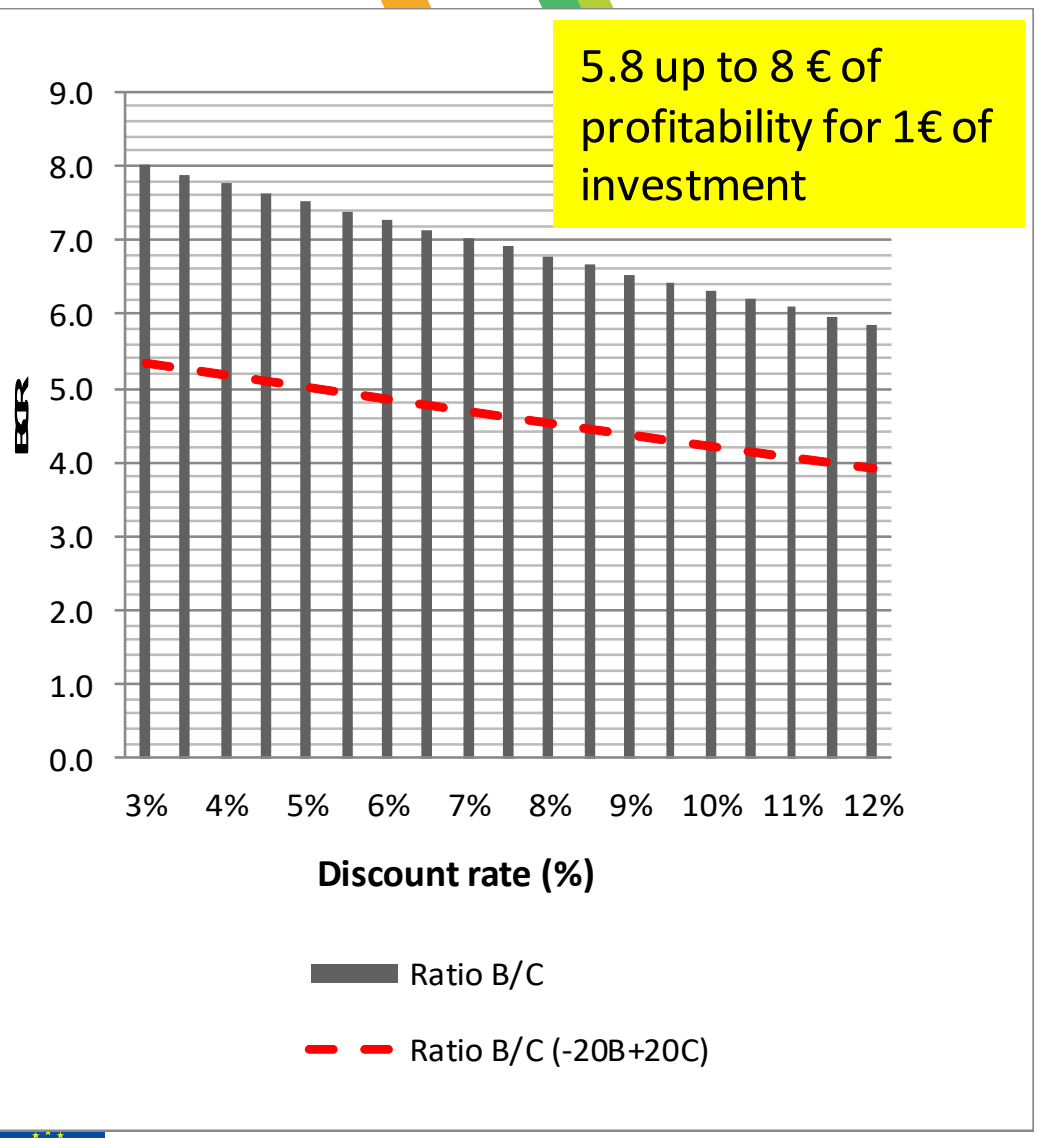
After 5 years the intervention has a positive economic return



Sensitivity analysis to discount rate



Conclusions



Economic assessment demonstrate long-term return.
Importance of the need to allocate financial funds for triple-win interventions.
Need to follow-up and public policies aimed at maintaining the effects at later ages.
Benefits are potential and could be at risk if the achievements are not enhanced.

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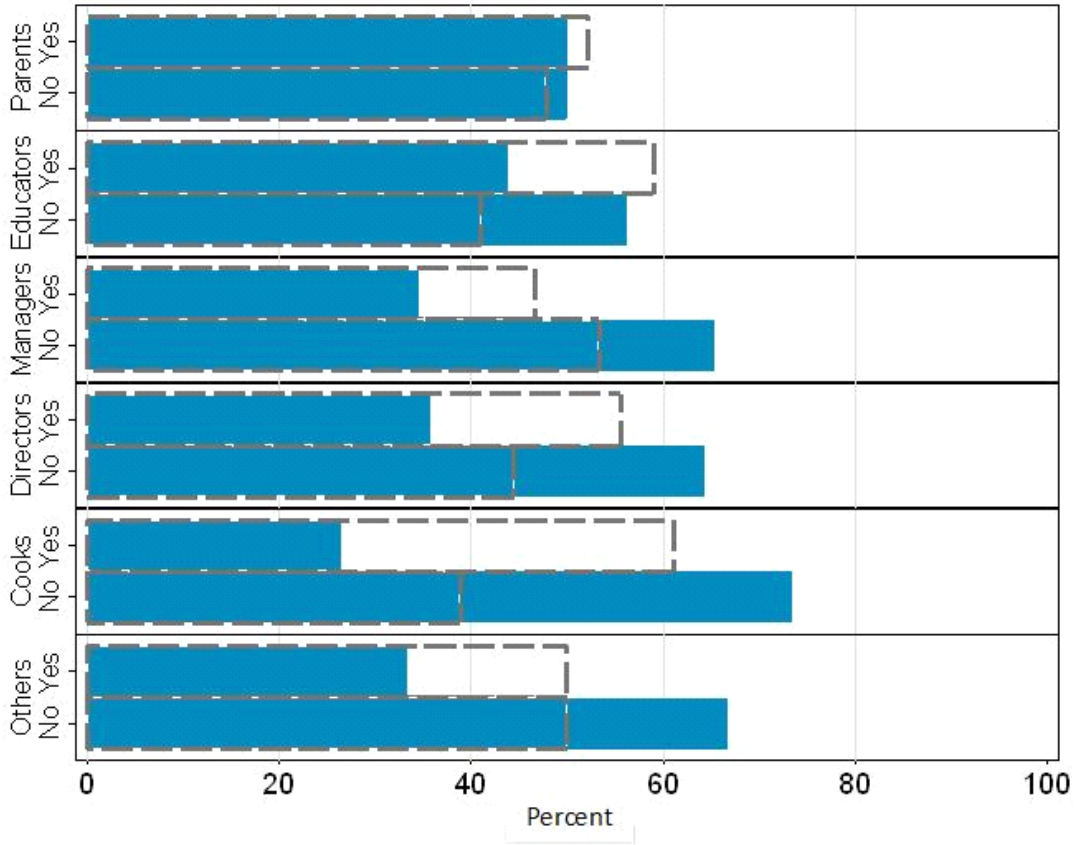
Conclusions: School community acceptance of implementation process

Do you think the path at which healthy and ecologic food is being implemented is adequate?



Aceptability is a key issue and need to be reinforced for parents

Cooks play a key role in the intervention

Nutricional workshops made a significant difference

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Conclusions: Other lessons learned on implementation

Short circuit does not mean proximity (footprint was worse off, difficulties with the licitations)

Not enough ecological production for collective provision (eg schools)

Healthy habits can be assumed by children at early stages (children did not present inconveniences)