This is an Accepted Manuscript version of the article published in the journal Public Health Nutrition. The final published version is: Ponce, J., Ramos-Martin, J. (2017): "Impact of two policy interventions on dietary diversity in Ecuador, *Public Health Nutrition*, Vol. 20(8): 1473-1480, available online at: https://doi.org/10.1017/S1368980017000052

Impact of two policy interventions on dietary diversity in Ecuador

Juan Ponce and Jesus Ramos-Martin*

Departamento de Desarrollo, Ambiente y Territorio, Facultad Latinoamericana de Ciencias Sociales (FLACSO),

La Pradera E7–174 y Av. Diego de Almagro, 170518 Quito, Ecuador

*Corresponding author: Email jramos@flacso.edu.ec

Abstract

Objective: To differentiate the effects of food vouchers and training in health and nutrition on consumption and dietary diversity in Ecuador by using an experimental design.

Design: Interventions involved enrolling three groups of approximately 200 randomly selected households per group in three provinces in Ecuador. Power estimates and sample size were computed using the Optimal Design software, with a power of 80%, at 5% of significance, and with a minimum detectable effect of 0.25 (standard deviations). The first group was assigned to receive a monthly food voucher of $40. The second group was assigned to receive the same $40 voucher, plus training on health and nutrition issues. The third group was served as the control. Weekly household values of food consumption were converted into caloric intake per person per day. A simple proxy indicator was constructed for dietary diversity, based on the Food Consumption Score. Finally, an econometric model with three specifications was used for analysing the differential effect of the interventions.

Setting: Three provinces in Ecuador, two from the Sierra region (Carchi and Chimborazo) and one from the Coastal region (Santa Elena).

Subjects: Members of 773 households randomly created (*n* 4343).

Results: No significant impacts on consumption in any of the interventions was found. However, there is evidence that voucher systems have a positive impact on dietary diversity. No differentiated effects were found for training intervention.

Conclusions: The most cost-effective intervention to improve dietary diversity in Ecuador is the use of vouchers to support family choice in food options.

JEL-codes: C90, I38, O54, R28
Keywords: Food vouchers, training, experimental design, Ecuador, policy effectiveness.

Introduction

Several developing countries have implemented policies in an attempt to reduce or eliminate malnutrition among children, with a focus on those aged less than five years. Among the most frequent policies implemented are cash transfers or conditional cash transfers (CCT), in kind transfers, mothers' training on health and nutrition issues, infrastructure improvements, and vouchers for food[(1)]. In the majority of successful programmes, a combination of interventions are implemented jointly, thus creating the uncertainty of exactly which aspect of the policy yielded which result. To the best of our knowledge, few studies have disentangled the separated effect of each component [(2)]. One strategy often used that combines different interventions is the conditional cash transfer programmes. In these kind of programmes, cash transfers are generally combined with mothers' training, nutritional supplement, and/or health

care centre improvements. The research presented here is the first study to disaggregate the separated effects of each intervention in the Ecuadorian context.

As stated by Torres[3], Ecuador's persistent malnutrition and increasing overweight and obesity are a source of concern[4–6]. According to the National Survey of Health and Nutrition of Ecuador[6], 30% of schoolchildren are estimated to be overweight, while 15% of them are undernourished. Torres also stresses that health, nutrition and food are scarcely mentioned in the Ministry of Education's curriculum update[7] and quality standards[8]. The consequence of this omission is that, the main goal of Ecuador's School Feeding Progamme (Programa de Alimentación Escolar)[9] has the only the purpose of improving student attendance while supplementing children's nutrition. However, this intervention is currently done with a focus on calorie intake via fortified cookies and oatmeal, disregarding dietary variety.

The lack of dietary variety is one of the sources of malnutrition in Ecuador. Minimum food diversity, defined as consumption of at least four food groups during one day before the survey, was found to be reached by only 63.8% of breastfed children between 6 and 23 months old, while this went up to 82% for non-breastfed children[6]. Similar results were found for frequency of food intakes, with 60% of breastfed and only 37.4% of non-breastfed children reaching the minimum frequency defined in the survey. Combining the two, dietary variety and frequency of food intakes, results in the so-called minimum acceptable diet, which shows very low values in Ecuador, 43.4% for breastfed children and only 17.8% for non-breastfed children.

Interventions are designed in many countries to combat malnutrition. Most of the existing literature evaluating interventions such as cash transfers, vouchers and nutrition training are focused in economically deprived population in developed economies. However, malnutrition is a more pressing issue in Latin America that in developed economies, which explains that CCT programmes are an important component of social policy. Since the initial experiences with CCT in Brazil and Mexico in the second half of the 1990s, most Latin American countries currently run some kind of CCT programme, and usually in conjunction with other interventions as a means of reducing poverty and improving human capital. In this regard,

CCT programmes provide cash transfers to poor families conditional on the children of these families attending school and/or visiting health care centres. The attractiveness of these programmes is the potential to combine short and long-term poverty reduction strategies. The cash transfers reduce short-term poverty, while long-term poverty is curtailed as children of poor families acquire different habits that result in improved human capital. Abundant research is available on the impact of such programmes on human development outcome variables[2]. In most of the cases, results show positive effects of CCT programmes on both education and health outcome variables, as well as on reducing poverty and income inequality.

There is a growing number of studies evaluating the impact of such interventions, although they are not conclusive regarding their effectiveness. Yablonski and O'Donnell[10] conducted a survey of case studies worldwide and concluded that, in general, there was evidence that supported the use of cash transfer schemes for improving malnutrition. A few years later, another review[11] analysed 20 experiences in developed economies that included the use of vouchers and other interventions. Only six of the studies were found to have a positive impact when using vouchers for improving dietary variety.

In developed economies, many of the studies have tested only one intervention. In the USA different studies[12, 13, 14] have shown how vouchers did increase consumption and improved variety in the diet. In the case of the UK, no conclusive results are found. In some cases changes in consumption or purchasing behaviour were not observed[15], while in other cases both quantities and variety of food were improved by interventions based on vouchers[16, 17].

There are cases in which more than one intervention was tested, usually including nutritional training or advice and the use of vouchers. Again, the results of the different studies are not conclusive. In one case in the USA[18] both vouchers and education had a positive effect on consumption of fruits and vegetables, but it was the combination of both that resulted with a higher impact. In one case in France[19], even though the authors did not differentiate results for each intervention, they concluded that vouchers could be a complementary measure to simply giving advice. In a follow-up of this study[20], however, the authors did measure the differential impact for each intervention and found that vouchers contributed to lowering the

risk of low consumption of fruits and vegetables, but they found no difference with the group that received advice only. Finally, in a randomised exercise conducted in New Zealand with 1,104 supermarket shoppers, the research showed no relation between education and healthier purchases, but it did find a relation between discounts and healthy food purchases[21,22]. In general terms, literature shows that in the case of developed economies, vouchers have had an impact on dietary diversity, whereas the impact of nutritional education or training is not that clear.

In the case of developing economies, Gentilini[23] went through several studies tackling the issue of cash transfers vs in-kind food transfers, leading to the conclusion that although there was relative effectiveness in these interventions, average impacts depended on the context, measurement and program design.

There is evidence of the positive impact of CCT on nutrition, specifically on stunting, anaemia, weight gain, preventative care visits, chronic malnutrition in infants, dietary diversity, and haemoglobin counts in the Latin American context. In his evaluation of the impact of Mexico's PROGRESA initiative on children's stunted growth and anaemia, Gertler's[24] findings not only revealed no significant impact on children's increased height, but also that the treatment group was 25.5 per cent less likely to be anaemic than the control group. The same data was interpreted by Behrman and Hoddinot[25] who found no positive, and in some cases, even negative impacts on nutritional indicators. A positive impact on nutrition indicators was also found by Maluccio and Flores[26] in their analysis of the Nicaraguan CCT (*Red de Protection Social*). The same positive impact was also found in a case in Honduras[27], in which the paper reported improvements in micronutrients on participants with respect to the control group. Attanasio et al.[28] evaluated the impact of the Colombian CCT on nutritional indicators. The paper found a positive and significant impact on chronic malnutrition of around -6.9 percentage points for those aged 24 months and less. One important point of this paper is that the authors found a positive impact on dietary diversity. However, there is also evidence of no impact of such interventions. In review of the Honduran PRAF CCT programme, Morris et al.[29] did not find significant impact on children's nutritional status. The same occurred when evaluating the impact of the Brazilian programme (*Bolsa Alimentacion*)[30], the authors found no evidence of weight difference between children belonging to a programmes and those

excluded from them at the time of enrolment. Paxson and Schady[31] evaluated the impact of the Ecuadorian CCT programme (*Bono de Desarrollo Humano*) on nutritional indicators among children between 3 and 7 years old. The study showed no significant effects on children's malnutrition rates.

One limitation of most of the studies presented above is that the effects of the different components of the programmes are not easily identified and very often not even measured. One exception is the paper by Hidrobo et al.[32]. The authors considered the comparative costs and nutritional outcomes of offering participants cash, food vouchers, or food transfers. All three modalities were found to significantly improve the quantity and quality of food consumed. However, the study did not analyse nutritional and health training. Hidrobo's analysis showed that offering food transfers was the least cost effective method while food vouchers were the most cost effective.

Building on the variety of studies presented above, our hypothesis is that food vouchers have a differentiated impact when compared with training in terms of cost-effectiveness. The rationale behind the hypothesis is that malnutrition is often, although not only, determined by budgetary constraints of households, which prevent them from having access to a diversified diet, which in turn drives nutritional problems in children as those described above for Ecuador.

This is thus the contribution of our paper, as we differentiate the effects of two components of a nutritional programme by using an experimental design. In our study, we randomly assigned households to one of the following three groups: a) food voucher, b) voucher plus training in health and nutrition, and compared them with a control group which received none of the above. This design permitted the study to differentiate the effects of each component of the different interventions.

Methods

Experimental Design and Interventions

Three groups of approximately 200 households per group were randomly selected in three provinces in Ecuador, two from the Sierra region (*Carchi and Chimborazo*) and one from the Coastal region (*Santa Elena*). Power estimates as well as sample size were computed using the Optimal Design software, working with a power of 80% per cent, at 5% per cent of significance, and with a minimum detectable effect of 0.25 (standard deviations). The baseline survey was conducted between September and November 2013 prior to a follow-up survey for each of the three groups one year later.

The first group of households (T1) was assigned to receive a monthly food voucher of 40 US$ dollar. The second group of households (T2) was assigned to receive the same $40 voucher, plus training on health and nutrition issues[1]. Finally, the third group (C) was served as the control and did not receive intervention.

Analysis of the three groups yielded the following impacts:

- T1-C = the impact of food voucher.
- T2-C = the impact of food voucher and training.
- T2-T1 (T3) = the impact of training.

---

[1] Monthly training sessions included topics on nutrition (and malnutrition), food preparation, children's health, mother's health, women's rights and women's empowerment.

Two different outcome variables were analysed for each of the three groups: (a) per capita caloric consumption at household level; (b) dietary diversity. Each of these variables is described below.

Per capita caloric consumption at household level

Following Hidrobo et al.[32], household food consumption aggregates are constructed from the value of food eaten at home and outside the home over a seven-day period. Weekly household values of food consumption were then converted to monthly values, which were subsequently converted to household per capita values by dividing the total by the number of household members. Results are robust to using adult equivalent values. Caloric intake is constructed from the amount of food consumed at home (from purchases, own stock, or in kind payments). The amount of food consumed for each item is multiplied for its energy value to obtain kilocalories [33]. Total weekly household caloric values are then converted to daily amounts and divided by household size to obtain caloric intake per person per day. The median caloric intake for 40 distinct food items were used to determine the per capita caloric consumption.

Dietary diversity

This study used the Food Consumption Score (FCS) [34], which considers the number of days that the household consumed the corresponding food group (staples, pulses, vegetables, fruit, meat and fish, milk and dairy, sugar and honey, oils and fats), multiplied by the number of days of the food group's weighted frequencies. The sum of the total categories was obtained to create a simple proxy indicator.

Model specification

Taking advantage of the panel data, the treatment effect was estimated using the following econometric specification:

$$Y_{i1} = \propto + X'_{i0}\beta_0 + \beta_1 T_i + \beta_2 Y_{i0} + \varepsilon_i \quad (1)$$

Where Y_{i1} is the outcome of interest for child i at follow up. The sub index 1 is for the follow up and 0 for the baseline. T_i are indicators that equal one if the household is in the corresponding treatment arm, and zero otherwise. Beta 1 is the corresponding impact estimate. Finally, X' is a vector of control variables at baseline, and Y_{i0} is the outcome of interest at baseline.

Three specifications were reported. First, the basic specification only includes dummies for the corresponding treatment. For each type of intervention several treatments were used, as well as dummies for comparing different interventions. T1 and T2 stand for each different type of intervention. T3 (T2-T1) takes the value of 1 for voucher plus training, and zero for voucher. Finally, T0 takes the value of 1 for all the treatment groups and zero for the control group.

The second specification includes as a control variable, the value of the outcome variable at baseline. Finally, the third specification includes the basic specification plus control variables at the household and head of household level. The age of the household head, the number of years of schooling, and dummies for being female and indigenous were included at this level. Finally, the number of children by age groupings (0-5 years old, number of members 6-14 years old), and other household members by age groupings (15-44 years old, 45-65 years old and number of members older than 65) were also considered.

The differences between random assignment and the real treatment impelled the use of an instrumental variable estimation, where treatment was instrumented by the original random assignment. As is accepted in the field, this study presumes that the original random assignment is a good instrument if two conditions are met. First, if the instrument is a good predictor of the real treatment and second, if the instrument meets the "exclusion restriction", which means that the only way of affecting the outcome variable is through program participation. Regarding the first condition, the following table introduced the results of the regression between the instrument and the real treatment.

Table 1. First stage. OLS between treatment and random assignment

	T1	T2	T3	T0
Coefficient	0.9766	0,.155	0.8727	0.9141
Standard error	0.0109	0.0158	0.0183	0.014
F value for the instrument	7,930.19	3,352.9	2,262.4	4,243.66
Number of cases	362	576	558	773

In all cases the coefficient is highly significant and with values larger than 0.9. The F value for the instrument is significant in all cases.

By using random assignment as the primary instrument, our estimates represent the local average treatment effect. This means that it represents the impact on those people that received the intervention because they were randomly assigned to participate in the programme.

Data and Baseline Characteristics

Table 2 introduces the results for the baseline survey.

Table 2. Baseline variables. Treatment arms and control group

Variable	Means			P-value of difference		
	Control	T1	T2	T1-C	T2-C	T1-T2
Household Head Characteristics						
Years of Schooling	7.535	7.731	7.638	[0.579]	[0.729]	[0.760]
Female	0.170	0.170	0.175	[0.992]	[0.889]	[0.885]
Age	33.8	32.6	34.0	[0.370]	[0.857]	[0.226]
Mestizo	0.795	0.766	0.810	[0.504]	[0.656]	[0.242]
Household Characteristics						
Number of children 0-5	1.527	1.480	1.564	[0.494]	[0.548]	[0.169]
Number of members 6-14	0.821	0.836	0.736	[0.894]	[0.338]	[0.330]
Number of members 15-44	2.149	2.333	2.239	[0.100]	[0.291]	[0.363]
Number of members 45-64	0.259	0.181	0.314	[0.174]	[0.298]	[0.008]
Number of members >64	0.264	0.292	0.204	[0.663]	[0.304]	[0.128]
Outcome variable						
Household caloric intake (daily)	7,638.6	7,529.6	7,415.6	[0.807]	[0.544]	[0.769]
Per capita caloric intake (daily)	1,660.8	1,635.6	1,609.6	[0.817]	[0.532]	[0.786]
Dietary diversity index	5.89	5.96	5.83	[0.595]	[0.630]	[0.281]
Numeber of individuals	997	920	2426			
Number of cases (households)	201	171	401			

Results from baseline show no systematic differences between each treatment arm and the control group, or among the different treatment arms. More specifically, no differences were found between T1 and C, between T2 and C, and between T1 and T2. We found only a significant difference between T1 and T2 in the number of members of 45 to 64 years old at household level. The lack of significant differences indicates that the randomisation worked properly. However, to get more precise estimations and to correct for possible differences in

baseline, all variables included in Table 1 were incorporated as control variables in the more complete specification used in the econometric models.

Results

To analyse results, the impact on per capita consumption and total household consumption (in logs) was evaluated (Table 3).

Table 3. Impact on consumption (logs). 2SLS estimates. Several treatments

	Per capita			Household		
	Specif 1	Specif 2	Specif 3	Specif 1	Specif 2	Specif 3
T1						
Coefficient	-0.007	0.009	0.014	0,037	0,034	0,045
Standard error	0.074	0.068	0.068	0,072	0,068	0,066
Number of cases	336	336	336	336	336	336
T2						
Coefficient	0.056	0.079	0.081	0.101***	0.106***	0.090***
Standard error	0.064	0.059	0.059	0.063	0.059	0.058
Number of cases	512	512	512	512	512	512
T3						
Coefficient	0.070	0.084	0.082	0.059	0.076	0.047
Standard error	0.067	0.063	0.063	0.066	0.063	0.061
Number of cases	513	513	513	513	513	513
T0						
Coefficient	0.029	0.046	0.049	0.075	0.074	0.065
Standard error	0.060	0.056	0.056	0.059	0.056	0.055
Number of cases	697	697	697	697	697	697

*** Significant at 10%.

There were no significant impacts found when using the log of per capita consumption in caloric terms as the dependent variable. However, when the log of total consumption at household level in caloric terms was considered, the dependent variable, had a significant impact on household consumption of T2 (voucher plus training). There were no other significant impacts found for the rest of treatment arms.

Table 4 reports the results for dietary diversity.

Table 4. Impact on dietary diversity. 2 SLS estimates. Several treatments.

	Specif 1	Specif 2	Specif 3
T1			
Coefficient	0.424*	0.396*	0.394*
Standard error	0.052	0.050	0.050
Number of cases	1,834	1,834	1,834
T2			
Coefficient	0.357*	0.330*	0.291*
Standard error	0.083	0.082	0.081
Number of cases	2,878	2,878	2,878
T3			
Coefficient	-0.092	-0.088	-0.125
Standard error	0.078	0.077	0.077
Number of cases	2,825	2,825	2,825
T0			
Coefficient	0.395*	0.358*	0.333*
Standard error	0.075	0.073	0.073
Number of cases	3,910	3,910	3,910

**Significant at 1%*

The diversity dietary index takes values between 1 and 8 with larger values indicating more dietary diversity. Results show a significant and positive impact of all interventions on dietary diversity. The impact of T1 and T2 are 0.4 and 0.3 respectively. However, there was no difference in the impacts across the different arm interventions. This important finding means that the voucher represents the most cost effective intervention in relation to dietary diversity.

Discussion and conclusions

Policy measures oriented to reduce malnutrition on children are present in most developing countries, especially in Latin America. They are usually expensive programmes that include different sorts of interventions, including cash transfers, food vouchers and nutritional

education or training. However, in many cases the differentiated outcomes of each intervention are not measured, leading to poor results regardless of the amounts of money invested. In this regard, the main implication of our findings is that those countries, where budgetary constraints are more important than in developed countries, should focus their interventions in providing conditional food vouchers to households. They have a positive impact on dietary diversity at a lower cost than vouchers plus training. This does not mean education is not important, as we discuss below.

In terms of public policy, our findings suggest, at least, two areas of work. The first is to study how to integrate and expand the voucher programmes to the entire population, in order to have a significant impact. One way to easily implement this would be by modifying the current Ecuadorian CCT- the human development bond[35], -- which is a subsidy for low-income households by attaching it to certain obligations. In 2013, about one million households benefited from these at 35 US$ per month. The bond could be converted into food vouchers, tradable for certain food items that would guarantee dietary diversity within the one million households that are current beneficiaries. This would revert some of the nutritional problems found in Ecuador presented in the introduction. This change would be consistent with previous research that showed the need for modifying the design of the bond as it had modest impacts on children's nutritional status in Ecuador[31,36].

The second is to analyse why training programmes have such a low incidence on dietary diversity, in Ecuador and elsewhere, as shown in this study and the studies highlighted. Torres[3] notes, there is a great potential for food and nutrition education at schools, if a holistic perspective is applied, that considers food's social, economic, cultural, historical, environmental and even emotional and sensory connections. This could be enlarged to include education on production systems and procurement with their links to their impacts upon labour conditions and the environment. According to Torres, such an initiative would easily fit with the Ecuadorian Development Plan, called The National Plan for Good Living[37], and with its key concept of good living. In this way, the School Feeding Programme described above should not be restricted to improving student's attendance and providing nutritional supplements, but rather engage in also providing nutritional education to children, probably by including these topics in the curriculum. This would guarantee further impact of training

programmes once parents are included. Last, these measures would be even more effective if the country had, as in many other countries, a national institute of research on food and nutrition, which is currently missing.

Although the literature covered here on interventions to reduce malnutrition focuses mainly on cash transfers and vouchers, most of the studies that also cover nutritional education and training reach the same conclusion as this study; training has moderate or no effect in improving dietary diversity[20–22]. Only in certain developed countries does training have a moderate impact[18,19]. With regard to cash transfers and food vouchers, some studies show no impact, as in the case of Honduras[29], Brazil[30] or Ecuador[31], while most of the cases show positive impacts. This is the case both of developed[10–14,16–18,20] and developing economies[27,28,38]. Our study contributes further, in that, the findings show that food vouchers have a positive impact on dietary diversity.

The major strength of our study is the differentiation of the relative impact of each intervention, which, as we saw above, is usually not present in the literature. Regarding limitations, our study only analyses impact on dietary diversity, and therefore the nutritional status of children is not covered. Although we had collected evidence on this issue, the size of the sample was not big enough to offer conclusive results, and is that reason, we decided not to include it here.

Future research in Ecuador could fill knowledge gaps in at least two different ways. On the one hand, it could include an evaluation of interventions on nutritional status of children, requiring bigger sample sizes than the one used here. On the other hand, it could focus on designing the changes to the current CCT programme (Human Development Bond), so that food vouchers are used instead of cash transfers, in a more cost-effective way.

In conclusion, after evaluating the separated impact of food voucher programs and vouchers plus training on consumption and dietary diversity in different regions of Ecuador, these are the main results found:

1) Dietary diversity alone was found to be influenced by the food voucher program, as well as the training.

2) This study did not find any significant impact of interventions on consumption.

3) Surprisingly, the training showed similar magnitude of impacts with no significant differences to the voucher food program on dietary diversity.

4) The nutritional status of children should also be evaluated in future analyses of these types of interventions.

5) Ecuador could dramatically increase the impact of current CCT programmes if food vouchers were distributed instead of cash transfers, being a more cost-effective measure, as it would increase dietary diversity for more than one million households at no extra cost with respect to the budget of the current programme.

Based on these results, we conclude that the most cost effective intervention in the case of Ecuador is the voucher programme.

Acknowledgements: The authors would like to thank the associate editor and three anonymous reviewers for their comments that have greatly improved the work presented here.

Financial support: This work was supported by the World Food Programme in Ecuador and by the Spanish Ministry of Science and Innovation (grant number HAR2013-47182-C2-1-P). The funders had no role in the design, analysis or writing of this article.

Conflict of interest: None.

Authorship: J.P. formulated the research question, designed the study, carried it out, analysed the data and wrote the article. J.R.-M. drafted the article, revised it critically and edited it.

Ethics of human subject participation: This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects/patients were approved by the FLACSO Ethics Committee. Written informed consent was obtained from all subjects/patients.

References

1. van den Bold M, Quisumbing AR & Gillespie S (2013) *Women's Empowerment and Nutrition. An Evidence Review*. Washington DC: .

2. Fiszbein A & Schady N (2009) *Conditional cash transfers. Reducing present and future poverty*. Washington DC: .

3. Torres I (2016) Policy windows for school-based health education about nutrition in Ecuador: Table 1: *Health Promot. Int.*, 1–9.

4. Freire WB, Silva-Jaramillo KM, Ramirez-Luzuriaga MJ, et al. (2014) The double burden of undernutrition and excess body weight in Ecuador. *Am. J. Clin. Nutr.* **100**, 1636S–1643S.

5. Popkin BM, Adair LS & Ng SW (2012) Global nutrition transition and the pandemic of obesity in developing countries. *Nutr. Rev.* **70**, 3–21.

6. Freire WB, Ramírez MJ, Belmont P, et al. (2014) *Tomo I: Encuesta Nacional de Salud y Nutrición de la población ecuatoriana de cero a 59 años. ENSANUT-ECU 2012*. Quito: .

7. Ecuadorian Ministry of Education (2010) *Actualización y Fortalecimiento Curricular de la Educación General Básica [Curriculum Update and Strengthening for Basic Education]*. Quito: .

8. Ecuadorian Ministry of Education (2012) *Estándares de Calidad Educativa [Education Quality Standards]*. Quito: .

9. Ecuadorian Ministry of Education (2012) *Proyecto Programa de Alimentación Escolar [School Feeding Program]*. Quito: .

10. Yablonski J & O'Donnell M (2009) *Lasting benefits. The role of cash transfers in tackling child mortality*. London: .

11. An R (2013) Effectiveness of subsidies in promoting healthy food purchases and consumption: a review of field experiments. *Public Health Nutr.* **16**, 1215–1228.

12. Dimitri C, Oberholtzer L, Zive M, et al. (2015) Enhancing food security of low-income consumers: An investigation of financial incentives for use at farmers markets. *Food Policy* **52**, 64–70.

13. Herman DR, Harrison GG & Jenks E (2006) Choices Made by Low-Income Women Provided with an Economic Supplement for Fresh Fruit and Vegetable Purchase. *J. Am. Diet. Assoc.* **106**, 740–744.

14. Herman DR, Harrison GG, Afifi AA, et al. (2008) Effect of a Targeted Subsidy on Intake of Fruits and Vegetables Among Low-Income Women in the Special Supplemental Nutrition Program for Women, Infants, and Children. *Am. J. Public Health* **98**, 98–105.

15. Buyuktuncer Z, Kearney M, Ryan CL, et al. (2014) Fruit and vegetables on prescription: a brief intervention in primary care. *J. Hum. Nutr. Diet.* **27**, 186–193.

16. Burr ML, Trembeth J, Jones KB, et al. (2007) The effects of dietary advice and vouchers on the intake of fruit and fruit juice by pregnant women in a deprived area: a controlled trial. *Public Health Nutr.* **10**.

17. McFadden A, Green JM, Williams V, et al. (2014) Can food vouchers improve nutrition and reduce health inequalities in low-income mothers and young children: a multi-method evaluation of the experiences of beneficiaries and practitioners of the Healthy Start programme in England. *BMC Public Health* **14**, 148.

18. Anderson J V, Bybee DI, Brown RM, et al. (2001) 5 A Day Fruit and Vegetable Intervention Improves Consumption in a Low Income Population. *J. Am. Diet. Assoc.* **101**, 195–202.

19. Bihan H, Castetbon K, Mejean C, et al. (2010) Sociodemographic Factors and Attitudes

toward Food Affordability and Health Are Associated with Fruit and Vegetable Consumption in a Low-Income French Population. *J. Nutr.* **140**, 823–830.

20. Bihan H, Méjean C, Castetbon K, et al. (2012) Impact of fruit and vegetable vouchers and dietary advice on fruit and vegetable intake in a low-income population. *Eur. J. Clin. Nutr.* **66**, 369–375.

21. Blakely T, Ni Mhurchu C, Jiang Y, et al. (2011) Do effects of price discounts and nutrition education on food purchases vary by ethnicity, income and education? Results from a randomised, controlled trial. *J. Epidemiol. {&} Community Heal.* **65**, 902–908.

22. Ni Mhurchu C, Blakely T, Jiang Y, et al. (2010) Effects of price discounts and tailored nutrition education on supermarket purchases: a randomized controlled trial. *Am. J. Clin. Nutr.* **91**, 736–747.

23. Gentilini U (2015) Revisiting the 'Cash versus Food' Debate: New Evidence for an Old Puzzle? *World Bank Res. Obs.* **31**, 135–167.

24. Gertler P (2004) Do conditional cash transfers improve child health? Evidence from PROGRESA's control randomized experiment. *Am. Econ. Rev.* **94**, 336–341.

25. Behrman JR & Hoddinott J (2005) Programme Evaluation with Unobserved Heterogeneity and Selective Implementation: The Mexican PROGRESA Impact on Child Nutrition. *Oxf. Bull. Econ. Stat.* **67**, 547–569.

26. Maluccio JA & Flores R (2005) *Impact Evaluation of a Conditional Cash Transfer Program: The Nicaraguan Red de Protección Social*. Washington DC: .

27. Siega-Riz AM, Estrada Del Campo Y, Kinlaw A, et al. (2014) Effect of Supplementation with a Lipid-Based Nutrient Supplement on the Micronutrient Status of Children Aged 6-18 Months Living in the Rural Region of Intibuc{á}, Honduras. *Paediatr. Perinat. Epidemiol.* **28**, 245–254.

28. Attanasio O, Gómez LC, Heredia P, et al. (2005) *The short-term impact of a conditional cash subsidy on child health and nutrition in Colombia*. *Rep. Summ. Fam. 03*. London: .

29. Morris SS, Flores R, Olinto P, et al. (2004) Monetary incentives in primary health care and effects on use and coverage of preventive health care interventions in rural Honduras: cluster randomised trial. *Lancet* **364**, 2030–2037.

30. Morris SS, Olinto P, Flores R, et al. (2004) Conditional cash transfers are associated with a small reduction in the rate of weight gain of preschool children in northeast Brazil. *J. Nutr.* **134**, 2336–2341.

31. Paxson C & Schady N (2010) Does Money Matter? The Effects of Cash Transfers on Child Development in Rural Ecuador. *Econ. Dev. Cult. Change* **59**, 187–229.

32. Hidrobo M, Hoddinott J, Peterman A, et al. (2014) Cash, food, or vouchers? Evidence from a randomized experiment in northern Ecuador. *J. Dev. Econ.* **107**, 144–156.

33. Ministerio de Salud Pública del Ecuador (2010) *Tabla compilada de composición química de alimentos ecuatorianos, revisión de 2010*. Quito: .

34. World Food Programme (2008) *Food Consumption Analysis. Calculation and use of the food consumption score in food security analysis*. Rome: .

35. Ministerio de Inclusión Económica y Social (2013) *Informe de Gestión*. Quito: .

36. León M & Younger SD (2007) Transfer payments, mothers' income and child health in ecuador. *J. Dev. Stud.* **43**, 1126–1143.

37. SENPLADES (2013) *National Plan for Good Living 2013–2017*. Quito: .

38. Maluccio JA & Flores R (2005) *Impact Evaluation of a Conditional Cash Transfer Program: The Nicaraguan Red de Protecci{ó}n Social*. Washington DC.