

# **CRECIENDO FELIZ PROGRAM EVALUATION**

**Yale Student Partnerships for Global Health**

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*Prepared by Jose Gutierrez, Stephanie Granada, Sarah Merchant,  
Suhana Sarkar & Lily Vanderbloemen*

## ***Intended Use***

This report is intended to provide an evaluation of the efficacy of the *Creciendo Feliz* supplementary feeding program in fostering weight gain amongst undernourished children. This report intends to provide Futuro Valdivia health clinic in San Pedro, Santa Elena, Ecuador with an empirical basis for the continuation for this program. Specifically, this report will provide describe the extent to which the program helped children achieve a healthy weight and discuss potential recommendations for the improvement of this program.

## ***Introduction***

In Ecuador, approximately 8% of infants are born underweight, weighing less than 2,500 grams at birth. Most of the irreversible damage resulting from malnutrition occurs during the first 6 to 18 months of a child's life. [1] Malnutrition leads to childhood growth failure, delayed cognitive and behavioral development, diminished immune capacity, and increased risk of illness and mortality. As adults, survivors of malnutrition suffer diminished intellectual and work performance and women suffer greater risk of delivery complications. Investments in early childhood nutrition and development promotes improved adult productivity and is an essential long-term investment in human capital. [2]

## ***Program Description***

Creciendo Feliz is a nutritional supplementation program that aims to address malnutrition amongst infants 2 to 36 months served by the non-profit clinic Futuro Valdivia in the rural Santa Elena region of Ecuador. This program combines nutritional supplementation in the form of fortified milk and vitamins with individualized pediatric consultation to create a personal program of weight gain for each child enrolled. In addition to providing mothers with supplementary foods for the child, the pediatrician also provides them with general guidelines for infant feeding, food preparation, and nutrition information. This program continues until the child has achieved a health weight above the -2 standard deviation of a growth reference chart, or until the child reaches the age of three. This program has been implemented for approximately 4 years and its continuation relies almost entirely on the support of donors.

## ***Evaluation Focus***

This evaluation will compare the effect of the *Creciendo Feliz* program on child weight change while enrolled in the program to child weight change after discharge from the program.

## **Methods**

A survey was conducted for 146 children that participated in the Creciendo Feliz program from families in the Santa Elena province from rural towns within 2 hours of the Futuro Valdivia Clinic. Of these 146 children, 75 children completed the program, 53 children were still participating in the program, and 18 children abandoned the program. Only children who had participated and completed the Creciendo Feliz program with program entry, exit, and follow-up data were included ( $n = 75$ ). Program entry, exit and follow-up data were used to determine the mean average difference in growth.

Anthropometric measurements from program entry and program exit were collected from the child's medical record. Follow-up measurements were collected utilizing calibrated equipment by a trained nurse during a house visit more than six months following discharge. During follow-up, a oral survey for mothers was also conducted by Ecuadorian medical students to collect additional demographic and household socio-economic information, including mother's education and the families' food security.

Anthropometric data from program entry, program exit, and follow-up were then calculated into weight-for-age z-scores using WHO growth standards. [3] Z-score indicators were used to subsequently separate participants into three groups: Not Weight Compromised ( $z \geq -1$ ), At Risk for Weight Compromise or risk of underweight ( $-1 > z > -2$ ), and Weight Compromised or underweight ( $z \leq -2$ ). Weight-for-age criteria was used because weight is a more sensitive measure than height, and responds to short-term food restrictions readily. This separation into groups allowed differences in weight change to be observed by entry weight status. Participants with weight-for-age indicators above or below 5 standard deviations from the median ( $z < -5$  or  $z > 5$ ) were excluded.

Program effectiveness was measured by comparing the mean average difference in growth change for each group calculated from program entry and program exit and from program exit to follow-up visit. This method was chosen to compare the changes in growth when a child is supported by the program and the changes in growth that occurs when a child is no longer supported by the program.

The independent variable for evaluating the change in z-scores was current enrollment in the program from entry to exit. Thus, z-scores differences for children who were enrolled from entry to exit were compared to z-scores differences for children who had been discharged from exit to follow-up.

## Results

On average, children were enrolled in the program for 382 days. Amongst the entire samples of children who completed the program (n = 75), the mean difference in z-scores between the weight-for-age at entry and the weight-for-age at exit was 0.2604. At exit, 81.1% (n = 60) of all children enrolled had achieved a healthy weight-for-age.

The mean difference in z-scores between the weight-for-age at exit through follow-up was -0.3099.

**Table 1.** Mean weight-for-age z-score differences in children at entry, exit, and follow-up in categories of nutritional status at entry. Santa Elena, Ecuador, 2011-2014. (N = 75)

<b>Nutritional status at entry</b>	<b>Z-score difference between weight-for-age at entry and exit</b>	<b>Z-score difference between weight-for-age at exit and follow-up</b>
Weight not compromised (n = 13)	-0.8383	-1.055
Risk of low weight (n = 21)	0.0114	-0.166
Low weight compromised (n = 41)	0.7715	-0.1458

**Table 1** shows that for those with low weight comprise at entry to the program achieved an increase in the Z-score difference between entry and exit of weight-for-age of 0.7715. After discharge from the program until follow-up, this same group experienced a decrease in Z-score difference of -0.1458.

Amongst the risk-of-low weight group the Z-score difference between entry and exit weight-for-age was 0.0114 and the Z-score difference between exit and follow-up was -0.166.

The differences in z-scores from program entry and program exit between the three weight groups demonstrate that there is a positive mean average in growth change among children participating in the program who are at risk for being weight compromised ( $-1 > z > -2$ ), and children who begin the program weight compromised ( $z < -2$ ). Children who began the program weight compromised showed a greater positive mean average growth change than the children who began the program at risk for weight compromise.

An analysis of the demographic characteristics of children and mothers enrolled in the program reveals the following.

**Table 2.** Distribution of children according to family socio-economic conditions. Santa Elena, Ecuador, 2011-2014. (N = 75)

Variable	% Achieved healthy weight (n = 60)	% Still underweight (n = 15)	% Total enrolled (n = 75)
Home owned by parents	55.1	71.4	58.1
<i>Food security (ESCLA)</i>			
Food secure	3.4	0	2.8
Food insecure	63.8	42.9	59.7
Severely food insecure	32.8	57.1	37.5
Receives food subsidy	57.6	71.4	60.36
Mother completed secondary education	17.8	7.1	15.66

**Table 2** reveals that 0% of those who were still underweight after exit from the program were food secure and 57% were severely food insecure. Approximately 71.4% of children who were still at a low-weight received food subsidies. Only 7.1% of weight-compromised children at exit had mothers who had completed secondary education.

## ***Discussion***

The Creciendo Feliz program is effective for achieving weight gain for children currently enrolled in the program compared to children that were discharged from the program.

These findings are comparable to other evaluations of nutritional supplement programs that demonstrate a positive effect of nutritional supplement programs among children who are weight compromised or are at risk for being weight compromised. [4] [5] [6] Though these programs have different characteristics than Creciendo Feliz with different analysis methods, they conclude that supplementary feeding improves weight-for-age as measured by anthropometrics measurements.

The data also suggest that children who are most at risk for being underweight may benefit the most from the program. This is has also been supported by related studies on supplementary feeding programs. [5] [6]

The differences in z-scores from program exit and the follow-up visit demonstrated that there is a negative mean average change in growth in all weight groups. This finding may suggest that children who are no longer supported by the benefits of a nutritional supplement program may experience a decline in weight and growth change.

Though studies that compare an intervention group to a control group have been questioned for their validity, this study established important controls on the experimental group in the following ways. Because the control group is the same group of participants who underwent the intervention, the study controlled from biological characteristics and socioeconomic characteristics which were not expected to change for each participant during the duration of the program. Age was also controlled for by using the weight-for-age indicator using WHO growth charts.

The findings in the study are limited by a lack of complete awareness of the family's actions outside of the program that could have affected the child's growth. The generability of these findings to all future participants of the Creciendo Feliz program may also be limited by the small sample of participants whose change in growth was included in this study.

## ***Recommendations***

Based on the findings from the collected data and information obtained from the literature, we recommend the following:

### **I. Continue the Creciendo Feliz nutritional supplement program.**

Because *Creciendo Feliz* has effectively improved the nutritional status of weight-compromised children enrolled, Futuro Valdivia is recommended to continue implementing this program.

### **II. Target the children most at risk for being weight compromised.**

This program should be targeted to those who are already weight compromised because these children respond the most to the effects of the program. Specialized attention and additional assistance must be targeted at mothers who are severely food insecure and have not completed secondary education because their children are more likely to have the greatest risk of not achieving weight gain.

### **III. Review the discharge criteria utilized in the program.**

According to WHO recommendations for supplementary program discharge criteria, children should continue the program until they have achieved weight-for-age indicator at  $Z \leq -1$  from the average weight-for-age [1]. For children who have chronic conditions and morbidities that will prevent them from achieving about the  $Z \leq -1$  threshold, it should be considered that they should achieve a 15% weight gain before being discharged.

### **IV. Consider methods of supporting nutritional intake of children after discharge.**

The decrease in weight after discharge from the program suggests that families may require additional access to food for their children after the program. This particular nutritional supplementation program should be continued only up to age 3 at most, because promotion of nutritional status is most critical from months 0 to 24 [3]. Instead, additional resources will be need to address food security concerns for families that are unable to maintain a healthy nutritional status for children.

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