Evaluation of the Mexican Program
Oportunidades (formerly Progresa): Impact
on Child Nutrition and Health

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• Mexico has a long tradition of high expenditures in food and nutrition programs (FNP) which have included:
  ✓ Subsidies to the production and consumption of food
  ✓ Food distribution programs to low income households
  ✓ School breakfast programs
  ✓ Fortification of staple foods
  ✓ Distribution of micronutrient supplements
  ✓ Fortification of foods targeted to vulnerable populations
Food and Nutrition Programs in Mexico

• In 1993 México spent US $738 million in food and nutrition programs (FNP)
• Or ~ $275 per undernourished child per year
• Above World Bank recommendations at the time: ~$250/beneficiary/year
• Despite these high investment levels the prevalence of stunting was high and its reduction between 1988 and 1999 was disappointing
• Our group analyzed at that time the reasons for the low effectiveness of the high investments in FNP
Prevalence of stunting in Mexican children < 5 years of age in 1988 by subgroup

Rivera et al, 1993
% of children who received regularly food from different food groups by age (1999)

Decline in the prevalence of stunting in Mexico and South America between 1988 and 2000

- Mexico: 22.8 → 17.8 (↓ 5.0 percent points, ↓ 21.9 %)
- South America: 17.2 → 9.3 (↓ 7.9 percent points, ↓ 45.9 %)

What were the reasons for these poor performance despite high investments?
Distribution of stunted children < 5 years of age and beneficiaries of Food and Nutrition Programs (FNP) in Mexico by region in 1988.
Probability rate (± 95% C.I.) of participation in FNP in households with children < 5 years of age in 1988

The graph shows the probability rate of participation in a program (FNP) in households with children < 5 years of age in 1988, across different categories such as North Center, Mexico City, South, Urban, Rural, Non-Indigenous, High SEL, Medium SEL, Low SEL, 2-4 years, <2 years, Non-Stunted, and Stunted. The data points are represented with error bars indicating ± 95% confidence intervals.
Reasons for low effectiveness

• Inadequate targeting
  ✓ Emphasis in urban areas
  ✓ Lack of targeting to children under 2-3 years
• Foods distributed
  ✓ Not appropriate for young children (not complementary foods)
  ✓ No rich sources of Micronutrients
• Education component weak
• Duplication of actions and programs
  ✓ Lack of coordination
  ✓ Programs did not integrate food, health and education
Gain in height per 100 Kcal of supplement by year in the INCAP longitudinal Study (1969-1977)

Gain in height per 100 Kcal of supplement by year in the INCAP longitudinal Study (1969-1977)

Window of opportunity for investments in nutrition

Effects of multiple micronutrient supplementation on the growth of Mexican infants (<12 mo)\(^1\)

- GEE adjusted for age, initial length, sex, breastfeeding status, and socioeconomic status

Effect size - height

Efficacy of zinc supplement on the growth of children

Key changes in FNP in 1997-98 in Mexico

• In 1997 a new Federal Program *Progresa* (now called Oportunidades) was created

• Objective: to develop Human Capital through investments in nutrition, health and education

• Targeted to families in *extreme poverty*

• Households selected through 2-stage process (in Rural Areas):
  • poor communities
  • poor households within communities
Key changes in FNP in 1997-98 in Mexico

- Cash transfers used as financial incentives
  - Received only if families attend health clinics, utilize nutritional services, and children attend school regularly
- Women, not men receive benefits
- Incorporation staggered (# households):
- Budget (US Dollars):
  - $0.95 billion (2000) → $3.9 billion (2007)
- Evaluation component built into design
Growth in Coverage from 1997 to 2007
Incluye tres mil millones de pesos de recursos transferidos para Oportunidades Energético

<table>
<thead>
<tr>
<th>Año</th>
<th>Millones de pesos</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>39,000</td>
</tr>
<tr>
<td>2006</td>
<td>35,006.4</td>
</tr>
<tr>
<td>2005</td>
<td>32,843.3</td>
</tr>
<tr>
<td>2004</td>
<td>25,597.3</td>
</tr>
<tr>
<td>2003</td>
<td>22,334.5</td>
</tr>
<tr>
<td>2002</td>
<td>17,003.8</td>
</tr>
<tr>
<td>2001</td>
<td>12,296.6</td>
</tr>
<tr>
<td>2000</td>
<td>9,518.1</td>
</tr>
<tr>
<td>1999</td>
<td>6,898.8</td>
</tr>
<tr>
<td>1998</td>
<td>3,398.6</td>
</tr>
<tr>
<td>1997</td>
<td>367.3</td>
</tr>
</tbody>
</table>

MILLONES DE PESOS
Key changes in FNP in 1997-98 in Mexico

• Targeted to
  ✓ Low income households
  ✓ Rural areas (during first phases)
  ✓ Children < 2 years, undernourished children 2-4 y and pregnant and lactating women

• A Nutrition Component included
  ✓ Fortified foods for children and women
  ✓ Nutrition education

• Evaluation component was incorporated from the design
## Energy and nutrient content of complementary food for children (Nutrisano)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>% IDR*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>15%</td>
</tr>
<tr>
<td>Protein</td>
<td>36%</td>
</tr>
<tr>
<td>Iron</td>
<td>100%</td>
</tr>
<tr>
<td>Zinc</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>100%</td>
</tr>
<tr>
<td>Folic Acid</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin B₁₂</td>
<td>100%</td>
</tr>
</tbody>
</table>

*RDI for 1-3 year old children

**Ingredients:**
Powdered whole milk, sugar, maltodextrins, vitamins, minerals and flavor

**A puree consistency when hydrated**
Nutrition and health programs targeted to children < 3 y and pregnant women

Better growth, health and development

Human Capital formation

Wellbeing of next generation

More Productivity

Oportunidades has high potential for human capital development and for interrupting the transmission of poverty
Possible effects of the different *Oportunidades* components on the nutritional status of children

**Better Nutrition**

- **Better Diet**
- **Food Security**
- **Maternal and child care**

↓ infections

↑ Health Services coverage

Program Components

Distribution of stunted children < 5 years old and beneficiaries of Oportunidades by region in 1999

Distribution of stunted < 5 years old children and beneficiaries of Progresa by region in 1999
Distribution of stunted children < 5 years of age and beneficiaries of FNP in Mexico by region in 1999

Probability rate (± 95% C.I.) of participation in FNP* in households with children < 5 years of age in 1999

* Food and Nutrition Programs
Impact of the Mexican Program for Education, Health, and Nutrition (Progresa) on Rates of Growth and Anemia in Infants and Young Children
A Randomized Effectiveness Study

Juan A. Rivera, PhD
Daniela Suarez-Alvareza, MS
Jean-Pierre Habicht, PhD
Teresa Shimak, MS
Salvador Villafuerte, MD

More than half of the yearly 10.8 million deaths of children younger than 5 years are attributed to malnutrition. As assessed by underweight (≥2 SDs below the weight expected for that age, according to the international reference recommended by the World Health Organization [WHO]). These deaths are not caused by higher frequency of common childhood diseases but by higher case fatality rates and would not occur if the children were not malnourished. Malnourished children who survive have a high risk of impaired health and function throughout life, which contributes to the intergenerational continuation of poverty. In developing countries more than one quarter of all children younger than 5 years, about 150 million total, are estimated to be malnourished.

Available nutritional interventions and technologies have proven, under controlled conditions, to be efficacious in preventing and controlling malnutri-

Context: Malnutrition causes death and impaired health in millions of children. Existing interventions are effective under controlled conditions, however, little information is available on their effectiveness in large-scale programs.

Objective: To document the short-term nutritional impact of a large-scale, incentive-based development program in Mexico (Progresa), which included a nutritional component.

Design, Setting, and Participants: A randomized effectiveness study of 347 communities randomly assigned to immediate incorporation to the program in 1998 (intervention group: n=205) or to incorporation in 1999 (crossover intervention group: n=142). A random sample of children in those communities was surveyed at baseline and at 1 and 2 years afterward. Participants were from low-income households in poor rural communities in 6 central Mexican states. Children (N=850) 12 months of age or younger (n=373 intervention group; n=277 crossover intervention group) were included in the analyses.

Interventions: Children and pregnant and lactating women in participating households received fortified nutrition supplements, and the families received nutrition education, health care, and cash transfers.

Main Outcome Measures: Two-year height increments and anemia rates as measured by blood hemoglobin levels in participating children.

Results: Progresa was associated with better growth in height among the poorest and younger infants. Age- and length-adjusted height was greater by 1.1 cm (0.4 cm in the intervention group vs 2.3 cm in the crossover intervention group) among infants younger than 6 months at baseline and who lived in the poorest households. After 1 year, mean hemoglobin values were higher in the intervention group (11.2 g/dL; 95% confidence interval [CI], 10.3-11.3 g/dL) than in the crossover intervention group (10.75 g/dL; 95% CI, 10.5-11.0 g/dL) who had not yet received the benefits of the intervention (P < .05). There were no differences in hemoglobin levels between the 2 groups at year 2 after both groups were receiving the intervention. The age-adjusted rate of anemia (hemoglobin level ≤11 g/dL) in 1999 was higher in the crossover intervention group than in the intervention group (54.9% vs 44.3%; P = .03), whereas in 2000 the difference was not significant (23.0% vs 25.8%, respectively, P = .40).

Conclusion: Progresa, a large-scale, incentive-based development program with a nutritional intervention, is associated with better growth and lower rates of anemia in low-income, rural infants and children in Mexico.
Evaluation design

Year | 1998 | 1999 | 2000
---|---|---|---
Age | 0-12 mo | 12-24 mo | 24-36 mo

Intervention

Cross-over
Intervention

Gestation + BF + 20 pp (4-23)
12 pp (12-23)

Anemia

Growth

Year | Age | 1998 | 1999 | 2000
---|---|---|---|---
| 0-12 mo | 12-17 mo | 24-29 mo | 30-36 mo | 18-24 mo | 24-29 mo | 30-36 mo | 12-17 mo | 24-29 mo | 30-36 mo |

SES

Highest Impact expected

1999

[Graph showing Stunting and Growth across years and ages with data points for 1998, 1999, and 2000.]
• Positive effects on:
  - Growth
    • After 2 years
    • Restricted to:
      – Younger age (0-6 mo)
      – Lower Socioeconomic Status
    • 1.1 cm
  - Anemia
    • After 1 year
    • All ages
    • 20% decline

Effects on height after two years of program exposure in lower SES 6 mo old children

Effects on anemia after one year of exposure
Oportunidades had positive impacts on food consumption in adults

- Energy (Calories) consumption increased 6.4%
- Larger impact observed for vegetables and animal products
- 56% of children consumed fortified food supplements
- Dietary variety in adults increased

Frequency of meat intake in diet of women:

- Never: 10.2% in Control, 17.0% in Oportunidades
- < Once/week: 44.1% in Control, 49.2% in Oportunidades
- Once/week: 44.3% in Control, 34.3% in Oportunidades
- 2-6 days/week: 1% in Control, 0% in Oportunidades
- Daily: 0% in Control, 0% in Oportunidades

Rivera and Sotres, in preparation
Specific effects of the food supplement (Nutrisano) on the energy and Vitamin A intake of children 12-23 months of age

* p < 0.05 relative to Control

Rivera and Ramírez, in preparation
Specific effects of the food supplement (Nutrisano) on the iron and zinc intake of children 12-23 months of age

* *p < 0.05 relative to Control

Rivera and Ramírez, in preparation
Proportion of infants < 6 mo at baseline whose mothers reported regular consumption of supplement (≥ 4 days/week) in 1999

* Adjusted by age.

<table>
<thead>
<tr>
<th></th>
<th>Cross-over intervention</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poorest</td>
<td>59.9%</td>
<td>10.7%</td>
</tr>
<tr>
<td>Less Poor</td>
<td>51.7%</td>
<td>7.9%</td>
</tr>
</tbody>
</table>

n=31                      n=45                                   n=35                   n=49
The evaluation indicated that the nutrition education component was not effective in changing knowledge and behavior.

This led to design and application of a new education component based on social marketing.
Communication plan developed using formative research and social marketing

- Posters
- Demonstrations
- Massive media
- Videos for health personnel involved with the program and beneficiaries
Results of the communication plan for the adequate use of *Nutrisano* in the State of Veracruz

<table>
<thead>
<tr>
<th>Category</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate preparation</td>
<td>43.2</td>
<td>82.8</td>
</tr>
<tr>
<td>Consumed on daily basis</td>
<td>17.6</td>
<td>78.2</td>
</tr>
<tr>
<td>At noon</td>
<td>18.8</td>
<td>92.9</td>
</tr>
<tr>
<td>Consumed by children of appropriate age</td>
<td>52.3</td>
<td>88.1</td>
</tr>
</tbody>
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## Energy and nutrient composition of Nutrisano

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<td>36%</td>
</tr>
<tr>
<td><strong>Reduced Iron</strong></td>
<td>100%</td>
</tr>
<tr>
<td>Zinc</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>100%</td>
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<tr>
<td>Vitamin E</td>
<td>100%</td>
</tr>
<tr>
<td>Ascorbic Acid</td>
<td>100%</td>
</tr>
<tr>
<td>Folic Acid</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin B&lt;sub&gt;12&lt;/sub&gt;</td>
<td>100%</td>
</tr>
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</table>
Iron Absorption* from different sources in **nutrisano**

- **Ferrous Sulphate**: 14.4%
- **Ferrous Fumarate**: 5.4%
- **Reduced Iron**: 2.6%

* Using stable isotopes: Fe-57 y Fe-58
Energy and nutrient composition of the improved Nutrisano

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<td>Vitamin E</td>
<td>100%</td>
</tr>
<tr>
<td>Ascorbate</td>
<td>100%</td>
</tr>
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</tr>
<tr>
<td>Vitamin B&lt;sub&gt;12&lt;/sub&gt;</td>
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</tr>
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Prevalence of Stunting in Mexican children < 5 years of age by region in 1988, 1999 and 2006*

* WHO 2006 norms

González de Cossío T, Rivera J, González D, Unar M, Monterrubio E (submitted)
Relationship between NGI per capita (ppp) and stunting: the situation of Mexico in 1988, 1999 and 2006
Prevalence of Stunting in Mexican children < 5 years of age by region in 1988, 1999 and 2006*

* WHO 2006 norms

González de Cossío T, Rivera J, González D, Unar M, Monerrubio E (submitted)
Prevalence of Stunting in Mexican children < 5 years of age by region and urban/rural areas in 1988, 1999 and 2006*

* WHO 2006 norms

González de Cossío T, Rivera J, González D, Unar M, Monterrubio E (submitted)
Prevalence of Stunting in Mexican children < 5 years of age by Socioeconomic Conditions in 1988, 1999 and 2006*

* WHO 2006 norms

González de Cossío T, Rivera J, González D, Unar M, Monterrubio E (submitted)
Prevalence of Stunting in Mexican children < 5 years of age by ethnic background in 1988, 1999 and 2006*


*WHO 2006 norms

20 años (2026)

Prevalence of stunting:
- <10 (12)
- 10 – 19.9 (16)
- >20 (4)
Conclusions

• Impacts of Oportunidades on growth and on the reduction of rates of anemia have been documented.
• The impacts are likely due to improved targeting and to the development of a fortified weaning food which was well accepted and consumed by children 6-24 months.
• Cash did not seem to have an impact on the diet of children, although it could have influenced growth and anemia through investment in sanitation and improvement in living conditions.
Conclusions

• However, despite this success, Mexico still faces high prevalences of stunting and anemia in the south, the rural areas and among the poor.

• The evaluation of the program has resulted in recommendations for program improvement. Some of them have already been implemented and others are in the process of implementation.

• The use of evaluation results for improving the design and operation of programs is the best way to learn from experience.
Thank you

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