The Oriente Study: Program and Policy Impacts1,2

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Abstract

This journal supplement summarizes the many contributions of the Oriente Study to scientific knowledge. This article asks whether this knowledge has actually translated into program and/or policy changes. It describes 2 key areas where this is the case: 1) in defining the “window of opportunity” for nutrition interventions and changing policy regarding the targeting of nutrition interventions; and 2) in building the economic argument for investing in early childhood nutrition. It concludes that the study contributed most of the research evidence supporting the change in policy adopted by the U.S. government in 2009, which encourages the targeting of food-assisted maternal and child health and nutrition programs to pregnant mothers and children under 2 y of age. The paper reviews the process and the complementary evidence that led to this policy change. The Oriente Study also provides the first direct, and the strongest, evidence supporting the economic argument in favor of investing in early child nutrition. The results show a direct link between improved nutrition in early childhood and persistent benefits in adult physical status, schooling, cognitive skills, and economic productivity. It is hoped that, given the multiple shocks currently affecting the poor, these powerful results will help stimulate greater investments in maternal and child nutrition in the short term. J. Nutr. 140: 415–418, 2010.

Introduction

As demonstrated in this journal supplement, the Guatemala Oriente Study has made important contributions to scientific knowledge. The study was particularly influential because it demonstrated, using a rigorous cluster randomized trial, the impact of a nutrition intervention on several child outcomes, including birthweight, child growth, and mental development (1). The study also provides one of the most compelling analyses of the biological transfers between mother and offspring in marginal nutrition situations (2) and it was among the first to document the synergies between childhood malnutrition and infections and to highlight the protective role of nutrition interventions on growth in children with high rates of diarrhea (3). But the most unique aspect of the Oriente Study is its 40-y follow-up of the original study participants and their offspring over time (4). This feature makes the study one of the richest longitudinal nutrition dataset from a developing country; analyses of these data have provided direct evidence of the impact of investing in early childhood nutrition on human capital formation (5). The study also made several other contributions, including key methodological ones such as the differentiation of indicators of risk compared with indicators of benefit from interventions (6) and the development of analytical tools to identify subgroups that benefit the most from nutrition interventions (7–10) to help guide program targeting.

Undoubtedly, the study has produced a large body of knowledge and the question addressed in this paper is the extent to which this knowledge has actually translated into changes in the way we design, deliver, and target programs and whether or not it has led to policy changes. The paper highlights 2 key areas where the Oriente Study has had a major impact on programs and policy: 1) defining the “window of opportunity” for nutrition interventions and changing policy regarding the targeting of nutrition interventions; and 2) building the economic argument for investing in early childhood nutrition.

Policy change regarding the targeting of nutrition interventions

The Oriente Study was the first rigorous nutrition program evaluation that demonstrated that children who were exposed to a nutrition intervention during their first 3 y of life benefited more in terms of growth and recovery from malnutrition than children who were exposed at a later age (8,9,11,12). These results were so consistent across outcomes that many of the analyses that followed only focused on the cohort of children who had been exposed to the intervention during their first 3 y of life. A recent analysis of the impacts on adult economic productivity, however, compared participants who had been exposed to the intervention at different ages during childhood and found that the long-term effects on wages measured almost...
40 y later were limited to children who had been exposed before, but not after, the age of 3 y (13). The same is true for the long-term impact on adult cognitive skills and on women’s schooling (14).

The results of the Oriente Study thus motivated the research community to look at the differential benefits of nutrition interventions by age as well as by other important child, maternal, and household characteristics. However, despite the mounting evidence of the benefits of targeting nutrition interventions to infants and young children in their first 2–3 y of age, programs generally continued to focus on all children under the age of 5 or 6 y.

Compelling evidence on the timing of growth retardation was provided in 2001 by a global analysis of 39 datasets from the 3 regions of the developing world (15). The powerful figures presented in this paper make 2 key points. First, they show a striking consistency in the timing of growth faltering across countries and regions of the developing world. Second, they show that growth faltering occurs in the first 2 y of life for height-for-age and in the first 12–18 mo of life for weight-for-age, as seen by the rapid drop in mean Z-scores during these periods and the overall flattening of the curves thereafter. These graphs provide different but complementary evidence to the results of the Oriente Study. While the graphs (15) illustrate the increased vulnerability to growth faltering and undernutrition of developing country children during their first 12–24 mo of life, the Oriente results show the benefits from a nutrition intervention during this period of high vulnerability (i.e. the first 2–3 y). The graphs also show the flattening of height-for-age lines starting during the 3rd year of life and onwards and a similar flattening of the weight-for-age lines starting during y 2; similarly, the Oriente results document a lack of response of children to nutrition interventions after 3 y of age.

Although these findings led the nutrition research community to finally reach a consensus regarding the window of opportunity for intervening in nutrition, which is now defined as the period from conception (~9 mo) to 24 mo of age, programs continued to lag behind. Programs were still largely targeting the under-fives and maintained a strong focus on the treatment of undernutrition rather than its prevention. Two key processes and related publications seemed to have finally helped shift the balance: the process leading to, and the publication of, the landmark Lancet Series on Maternal and Child Undernutrition (16) and the simultaneous publication of the first randomized program effectiveness trial testing a preventive vs. a recuperative approach of targeting a food-assisted maternal and child health and nutrition (MCHN) program. The study, conducted in Haiti in the context of a program implemented by World Vision, showed that targeting pregnant women and all children 6–24 mo of age (preventive model) was more effective in reducing the community prevalence of childhood undernutrition than targeting underweight children (the traditional, recuperative approach) (17).

The Lancet Series and the process leading to its publication had a major impact on the nutrition community. One of the most consistent messages across the 5 papers in the series is the need to focus on the prevention of undernutrition by implementing programs during the window of opportunity. This key message is summarized in the comment from the Editor, as follows: “There is a golden interval for intervention from pregnancy to 2 y of age. After age 2 y, undernutrition will have caused irreversible damage for future development toward adulthood” (18). This unequivocal recommendation from the Lancet Series, combined with the first programmatic evidence from Haiti that adopting this recommendation leads to greater reductions in childhood undernutrition than pursuing “business as usual” led the Office of Food for Peace of the United States Agency for International Development to change its policy regarding food-assisted MCHN programming. The new Public Law 480 Title II program policies and proposal guidelines for 2009 (19) specifically encourages cooperating sponsors to design their food-assisted MCHN intervention on the basis of preventive action and to use the Preventing Malnutrition Under Twos Approach, which targets all children from conception until they reach 2 y of age.

Although a series of factors contributed to the U.S. government’s change in policy regarding the targeting of Title II-MCHN programs, the Oriente Study provided most of the empirical evidence needed to support such change.

Building the economic argument for investing in early childhood nutrition

The World Bank document “Repositioning Nutrition as Central to Development” (20) published in 2006 makes an excellent case regarding the urgency of investing in early childhood nutrition to accelerate progress in achieving the Millennium Development Goals and to foster sustainable economic development globally. The contribution of malnutrition to poverty, and to the intergenerational transmission of poverty, is now well recognized. Malnutrition in early childhood reduces adult human capital, hinders economic productivity, and perpetuates the cycle of poverty and malnutrition; it produces generations of unhealthy and uneducated adults with limited physical, cognitive, and reproductive capacity and wastes resources in increased health care costs due to poor population health and nutrition. The losses in Gross Domestic Product associated with malnutrition in early childhood are on the order of 2–3%, reductions in lifetime earnings of 10%, and losses in schooling of 0.7 grade (20). The second paper of the Lancet Series (21) also reviews the evidence and presents new analyses of 5 cohort studies (including the Oriente Study) that look at the consequences of maternal and child undernutrition for adult health and human capital. This new body of evidence corroborates that malnutrition in utero and stunting in the first 2 y of life lead to irreversible damages in key human capital outcomes, including adult height, schooling, and income, and under certain postnatal increases it increases the risks of obesity and chronic diseases.

New results from the Oriente Study on the impact of improved nutrition on adult wages were also published in conjunction with the Lancet Series (13). Exposure to the Atole supplement from birth to 2 y of age led to an increase in men’s hourly wages of US $0.67, which represents a 46% increase in average wages. For adult men who were exposed during their first 3 y of age, the hourly wages were US $0.62 higher than for the Fresco group, and for those exposed after the age of 3 y, there were no significant benefits in wages. This is unique evidence, from a developing country, of the direct impact, in the same individuals, of improving growth in early childhood on wages at adulthood.

More recent analyses of the Oriente Study data took these findings further and analyzed, using rigorous econometric modeling to control for the endogeneity of human capital variables, the pathways by which improved nutrition affects wages in Guatemala (22). As shown in the conceptual framework presented in Figure 1, the hypothesized pathways were: 1) through greater schooling and increased cognitive skills; and 2) through increased height, strength, and overall physical fitness and performance. The results show that when schooling,
cognition, and physical attributes are included in the model (and treated as endogenous variables), the key pathway by which improved nutrition increases wages is through cognitive skills and not through physical performance. The authors conclude that “brain” rather than “brawn” explains the higher wages of Guatemalan adult males, even in a developing country rural context where it would appear that physical attributes have productivity and labor-market rewards.

Another important finding illustrated in Figure 1 is that the nutrition intervention in early childhood had an effect on adult cognitive skills that was independent of schooling (14). Also, these new results suggest that the effect of schooling on cognitive skills might have been overestimated in the past, while work experience (tenure in skilled occupation) appears to be a much stronger determinant of cognition than previously thought (14).

In sum, the results of the Oriente Study provide the first evidence of its kind from a prospective study that links improvements in early childhood nutrition with subsequent adult cognitive skills, education achievement, and economic productivity. As such, the results provide the strongest evidence supporting the economic argument in favor of investing in early childhood nutrition.

**Conclusion**

In conclusion, the Oriente Study has contributed a unique body of scientific knowledge on the importance of investing in early childhood nutrition for short-term benefits and even more importantly for long-term human capital formation outcomes. Interestingly, it took almost 40 y for the study to contribute to policy change regarding the window of opportunity for intervening in nutrition in United States Agency for International Development programming. It also took a lot more than strong, consistent research evidence from a rigorous, high-profile, well-documented study. It took other complementary evidence, such as the global evidence regarding the timing of growth faltering, as well as years of advocacy, buy-in by key stakeholders such as the World Bank and the network of scientists involved in the *Lancet Series*, and last but not least, programmatic evidence that the recommendation to target children under 2 y could actually be operationalized and led to greater impacts.

The evidence provided by the Oriente Study to support the economic argument for investing in early childhood nutrition is much more recent and analyses are still on-going. The evidence, however, is powerful and attractive for policy makers, program implementers, and donors. It is likely that the recent findings summarized here will help mobilize greater investments in maternal and child nutrition, but, as illustrated with the example of the age of targeting, it will require time and much more than solid empirical evidence. It will require additional and complementary evidence and, even more importantly, effective, well-targeted advocacy and political awareness and commitment. Given the renewed motivation of the international development community to protect the poor and help mitigate the impacts of the multiple recent food and economic crises on assets and human capital in particular, it may well be that the time is right for positive changes in food and nutrition policies and investments.

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**Literature Cited**


