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Opportunities for Latin America and the Caribbean to Mainstreaming Nutrition into Agriculture

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Abstract

With a population of 590 million, food security is an important challenge for Latin America and the Caribbean (LAC) region. Although the average prevalence of undernutrition in the region has decreased during the last decade, the rate of reduction is unequally distributed across countries and across households. Furthermore, the countries that have been the most successful in reducing undernutrition are now facing high overweight rates and obesity.

Agriculture is a key economic and social sector for most LAC countries. Recently, however, the raise in demand for non-food products, such as biofuels, combined with higher market potential for LAC food products in developed countries has changed the dynamics of the sector. We show that countries in LAC where agriculture makes up a large part of the economy score poorly in terms of nutritional status of the most vulnerable groups, hence creating a nutritional-agricultural paradox.

Improving the nutritional status of the most vulnerable populations in LAC requires re-thinking the agricultural and food systems, to turn local agriculture and food production into a pathway to mitigate food insecurity in a sustainable manner. Expanding agricultural incomes and food production is necessary but not sufficient for food security; to achieve the latter, high quality food (in terms of diversity, nutrient content and safety) should be made both accessible and affordable for the most vulnerable. This paper presents evidences, cross-cutting principles, lessons learned, best practices and a set of tools to help policy makers to mainstream nutrition into agricultural sector policies and investments in LAC.

Key words: nutrition-sensitive agriculture, food safety, food quality, LAC region, undernutrition, overweight, agriculture policies and interventions, agricultural value chain.

I. Introduction

With a population of 590 million and more than three quarters of it living in cities, food security is an important challenge for Latin America and the Caribbean (LAC). The favorable natural resource endowment provides a comparative advantage to the region enabling to meet domestic demand and expanding its agricultural exports (Figure 1). However, despite a recent sustained period of regional economic and agricultural growth, the evolution of nutritional outcomes in the LAC region has been very unequal. Given the development in its agricultural sector, LAC should become the *avant-garde* region in designing policies pushing the boundaries in rethinking agriculture and nutrition linkages.

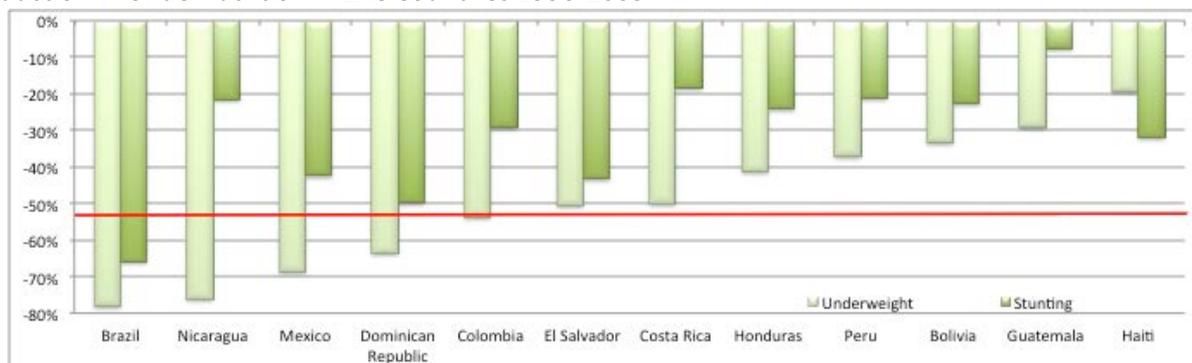
Share of Food Trade in LAC vs other Regions (only developing countries)



Source: WDI-COMTRADE

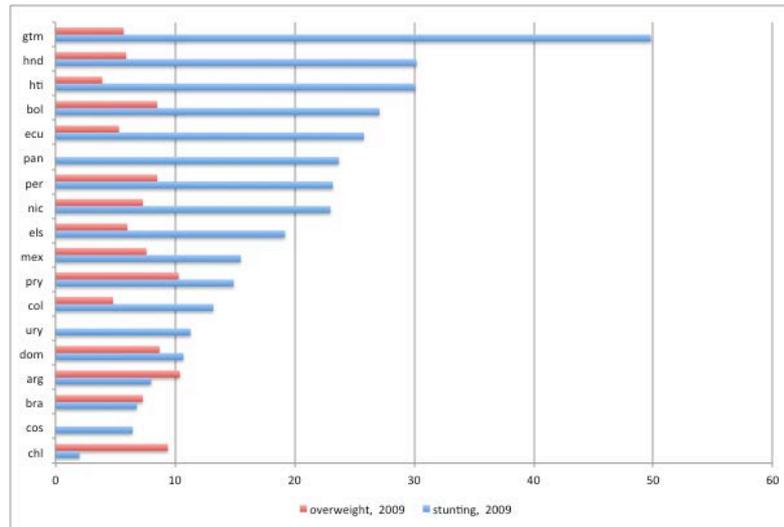
Overall, the LAC region has seen a reduction in undernutrition indicators (Figure 2). However, countries that have been the most successful in reducing undernutrition are now facing high overweight and obesity rates (Figure 3). The steady increase in overweight and obesity rates in the LAC region rival today those of the U.S. and Canada and is positively correlated with income inequalities (Finucane et al, 2011).

Reduction in Undernutrition in LAC Countries 1990-2005



Source: World Bank, 2012c

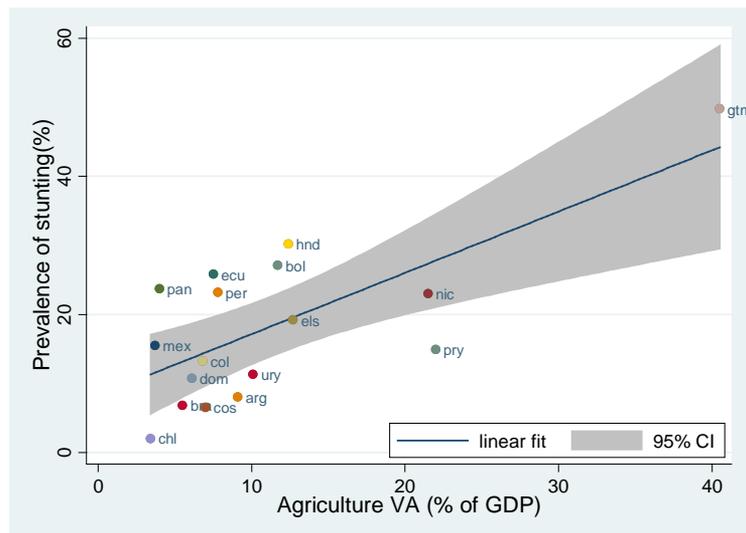
Prevalence of Overweight and Stunting in LAC Countries, 2009



Source: Author's calculations (see Annex 2 for details)

Countries in LAC where agriculture makes up a large part of the economy (agriculture GDP as % of total GDP), score poorly in nutritional status of the most vulnerable groups. Figure 4 shows that there's a large correlation (0.71) between the size of the agricultural sector and the prevalence of stunting. For example, Guatemala, Bolivia and Nicaragua have an agricultural sector that represents a relatively large share of their total GDP and yet households in these countries are experiencing the highest levels of both overweight mothers and undernourished children (Garret and Ruel, 2003).

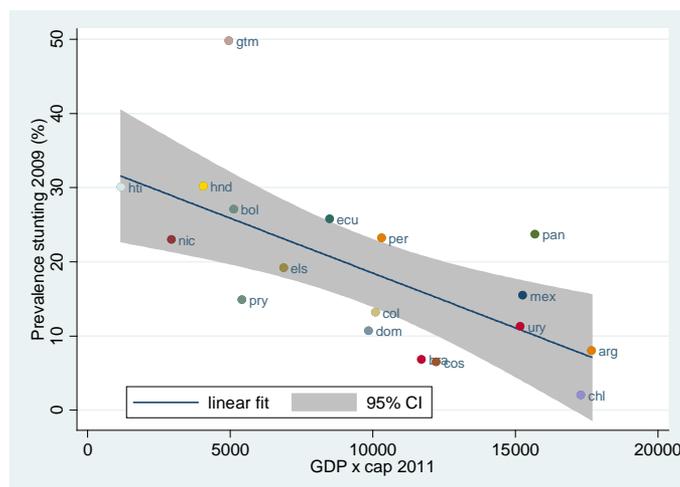
Agriculture Value Added 2011 (% of GDP) & Prevalence of Stunting 2009 (%)



Source: Author's calculations

As expected, the prevalence of stunting (extreme malnutrition) across the LAC countries is negatively correlated with GDP per capita (Figure 5). However, when seeking improved nutritional outcomes more broadly, it is not sufficient to focus on increasing income. Other factors such as food access, affordability, quality and diversity play an important role. Economic growth has been shown to play a central role in reducing the prevalence of calorie deficiency in most countries during their early stages of development, but the impact of increased income on nutrition declines as the development process evolves from the early stages (See Ecker O. et al., 2012 and Figure 6 for the case of India).

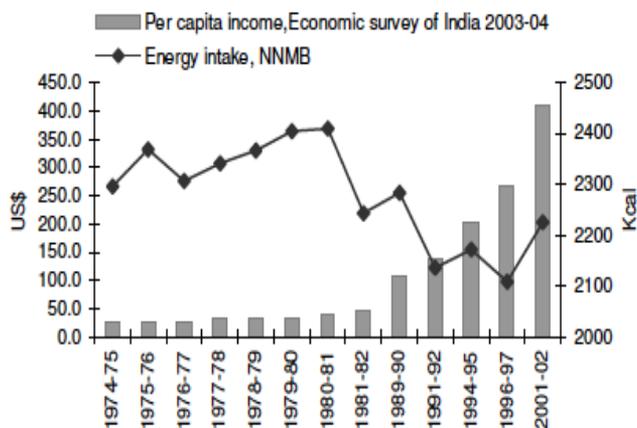
GDP per Capita PPP 2011 (current international \$) & Prevalence of Stunting 2009 (%)



Source: Author's calculations

Agriculture is a key economic and social sector of most LAC countries, providing an important source of income for poor rural households and source of growth for the region's economy. Recently, however, the raise in demand for non-food products, such as biofuels, combined with growing demand for meat and higher market potential for food products in developed countries have changed the dynamics of the sector. In order to improve the nutritional status of the most vulnerable populations in LAC, the agricultural and food systems need to be rethought to turn local agriculture and food production into a pathway to mitigate food insecurity in a sustainable manner. The expansion of income and food production has been shown to be a necessary, but insufficient condition to put an end to hunger and malnutrition². It will require improving food quality on the supply side in terms of variety, nutrient content and safety (FAO and EU, 2008; Fan S. et al., 2012), as well as improving education and decision-making on the food consumption (demand) side.

Trend in per Capita Income and Energy Intake in India from 1974 to 2002



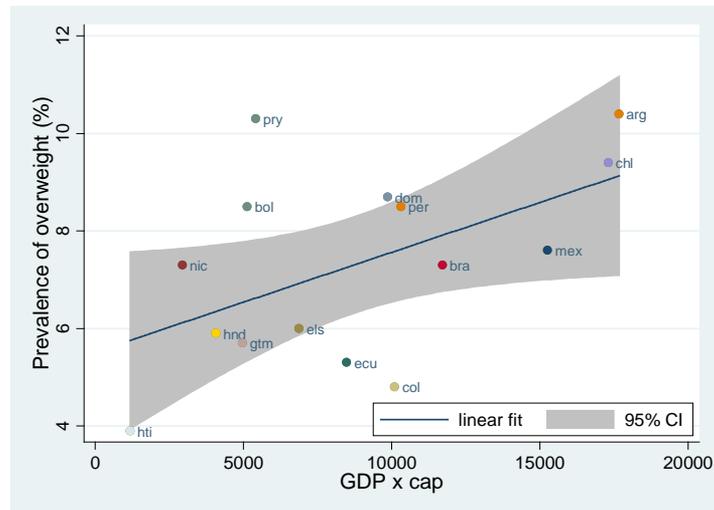
Source: Ramachandran P. 2006

Therefore, GDP per capita is not a good indicator to measure nutritional improvements and on the contrary can be positively correlated with the prevalence of overweight. A positive correlation does exist between the prevalence of adult overweight and the level of GDP per capita across LAC countries (Figure

² Andrew MacMillan, former FAO Director of Field Operations and fellow member of the Global Forum on Food Security and Nutrition, declared "expanding food production, alone, will never put an end to hunger and malnutrition" in a lecture at Reading University on June 11, 2012.

7). This is showing a transition of the nutritional problem of the population as countries move forward in their development processes.

GDP per Capita PPP 2011 (current international \$) and Prevalence of Overweight 2009 (%)

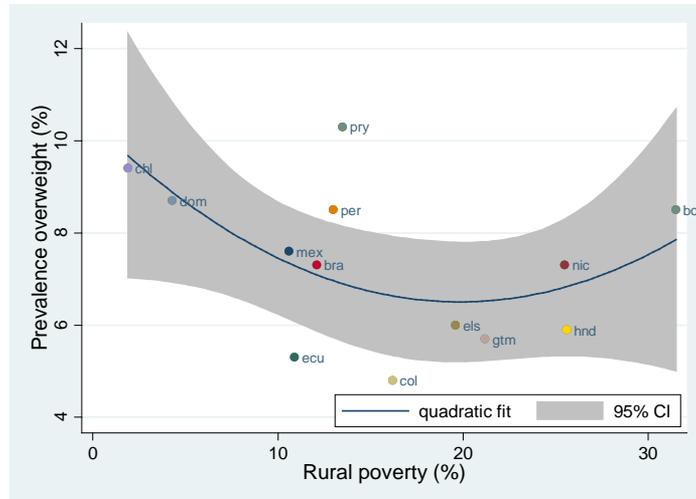


Source: Author's calculations

Rural poor in LAC can have overweight rates comparable to those in richer countries. This correlation between a proxy measure of the countries' standard of living and overweight was also found when several poverty indicators were used, such as poverty rates (below 1.25USD a day and below 2.5USD a day), and rural poverty rates (below 2.5USD a day). Interestingly, the correlation between the most severe rural poverty (below 1.25USD a day) and the prevalence of overweight seems to be defined by a U-shape (Figure 8). Research on women in LAC across education levels shows that in countries with higher per capita GDP, obesity is higher among women with low education levels, whereas the opposite holds for countries with lower per capita GDP (Rivera et. al., 2004).

Interestingly, the countries from Central America are those combining high levels of poverty and overweight. More research is needed in this area to understand this phenomenon, focusing in particular on the behavior of the lowest deciles of the distribution. However, part of the explanation of this phenomenon could be the consequence of the maize-based diet low in protein that has been prevalent in the region since the Aztecs civilization (Harner, 1977). Also, it could be due to the rise in prices of healthy foods exacerbated by the increase of market opportunities for traditional nutritious crops, such as the quinoa, and combined with a lack of targeted public programs to counterbalance the problem.

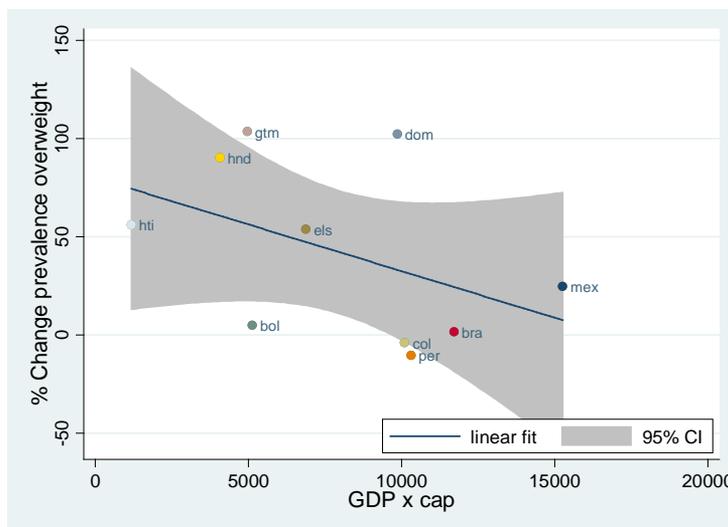
Rural Poverty Level 2009 (below \$1.25 a day) and Prevalence of Overweight 2009 (%)



Source: Author's calculations

Changes in the prevalence of overweight in the last two decades are negatively correlated with GDP levels, showing that poorer countries have experienced higher increases in the prevalence of overweight in the last 20 years (Figure 9), which could be interpreted as a catch up effect. However, this result should be taken with caution because the number of observations available to estimate the percent change in the overweight rate is very small and hence the result is not significant at the standard 5% level.

GDP per Capita PPP 2011 (current international \$) and Changes in Prevalence of Overweight 1990-2009 (% variation)



Source: Author's calculations

Mainstreaming nutritional considerations into agricultural operations could increase the supply of and access to nutritious food, which can improve the nutritional status of individuals (Hoddinott J., 2012). The international community and in particular the recent research and policy literature have increased their efforts to highlight the interrelationships between nutrition and agriculture. This Guidance Note is a companion note that tries to bridge the gap between the conceptual framework and the tools that have

been proposed so far under the [Global Guidance Note](#)³, presenting policy makers and project managers with a set of tools and examples of initiatives and operations in LAC that would help mainstream nutritional outcomes into agricultural sector policies and investments. This note first describes the current situation in LAC with respect to agriculture and nutrition, then offers practical guidance to policy makers and project managers in the form of levers available to them that could positively impact the nutritional outcomes of their agricultural projects, and finally presents a set of current and potential future operations following a basic country typology.

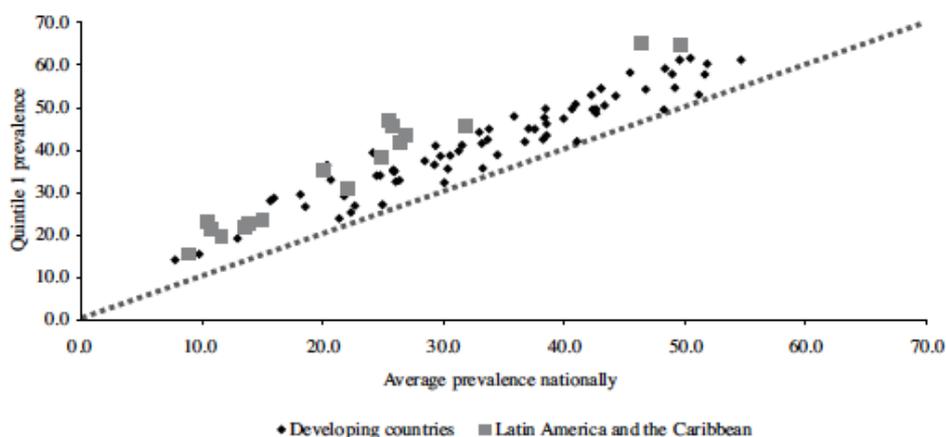
II. The Context: Nutrition and Agriculture in LAC

Stunting

Rates of children stunting in the bottom quintile of LAC’s population is among the highest in the world (Figure 10). Although the average prevalence of child stunting decreased during the last decade in the LAC region, the rate of reduction is unequally distributed across countries and across households. Child stunting has direct short-term private and social costs_ such as mortality, morbidity, disability and monetary costs_ and indirect long-term costs *such as reduced cognitive abilities, late entry into the education system, higher school drop-out rates, reduced economic productivity, reduced reproductive performance and increased chance of contracting metabolic and cardiovascular diseases_* (Paraje, 2009 ; Victora et al., 2008; Strauss and Thomas, 2008; Behrman and Deolalikar, 1988). The disproportionate concentration of stunting in the lowest socio-economic strata implies that stunting is a consequence, as well as a cause of economic inequality, thus creating a vicious circle.

III.

Prevalence of child stunting in the poorest quintile 1990-2005 (%) - 49 developing countries, 86 observations



Source :. Paraje, G. 2009

Obesity

The new burden of obesity is now spreading to the most vulnerable households in the poorest nations of the LAC region, with a particular concentration in urban areas.⁴ In LAC some segments of the population

³ <https://www.securenutritionplatform.org/Pages/DisplayResources.aspx?RID=151>

⁴ Overweight and obesity (i) in the world: Eberwine D. 2002, Popkin B, 2009; Mendez MA, Monteiro CA, Popkin BM 2005, Webb P., Block S. 2010 Bleich S, Cutler D, Murray C, Adams A, 2007. (ii) in LAC : Andrade F. , 2006; Fraser B. 2005; Uauy R, Albala C, Kain J. 2001.

continue to suffer from undernourishment, while others exhibit excess weight gain, contributing to the development of non-communicable diseases such as diabetes and cardiovascular diseases. In Latin America, the rate of diabetes was higher than the world average in 1995 and was expected to have an estimated 42% increase between 1995 and 2025 (Andrade, 2006). Such non-communicable diseases will have a dramatic effect on the population's future health, requiring a greater share of public expenditures to be directed towards overcoming this latent health problem. Annual costs associated with diabetes are estimated to be more than US\$65 billion for the region (Barceló A. et al., 2003).

Obese women often exhibit high levels of anemia in combination with poor diets, resulting in underweight newborns. Several factors including inadequate diets during their growth cause these children to remain underweight throughout their childhood, which paradoxically seems to increase their risk of obesity later in life (Fraser, 2005). Paradoxically, the double burden of underweight and obesity therefore often co-exists within the same household.

The obesity problem in LAC reflects a global trend in shifting diets towards foods high in sugar, salts, and saturated fats. Driven by increases in incomes and relative prices together with structural changes such as urbanization, female labor force participation, and infrastructural development, the diversity of markets and existing food environments also play a role (Cummins and Macintyre, 2005; Rayner and Lang, 2012). Further, in LAC and in particular in Central America, this shift in diets seems to have been in part supply driven by international trade agreements and the increased availability of sugared beverages and highly processed snack products (Rivera et. al., 2004; Hawkes, 2006).

The change in diets in the LAC Region has also been reinforced by the recent change in the distribution channel and the expansion of the supermarkets. In 1990 the retail market accounted for a maximum of 10 to 20 percent of national food retail sales, while in 2000, supermarkets had risen to occupy 50 to 60 percent of national food retail; approaching the 70 to 80 percent share in the United States or France. Latin America has thus seen in a single decade the same development of supermarkets that the United States experienced in five decades (Reardon and Berdegue, 2002). While supermarkets in themselves may be a good source of nutritious food compared with other forms of retailing⁵ and avails fresh produce across seasons, they often drive a broader shift in diets towards non-traditional and processed foods. This shift is often reflected also in local markets and small shops where similar products often are offered (Byerlee et. al., 2013).

In the LAC region, caloric availability is in general not the main problem, as staple foods provide sufficient energy for the population. Rather, the problem is a diet composed mainly of carbohydrates that lacks essential nutrients such as proteins and micronutrients. Livestock products, for instance, are an excellent source of protein and micronutrients not found in crops (vitamin B-12, calcium, zinc and riboflavin) that are especially important for women and children. The challenge is to increase the caloric quality, at the same time making it affordable and identifiable to the most vulnerable households in the LAC region.

Progress towards the Millennium Development Goal of halving the proportion of people who suffer from hunger is uneven in Latin America and the Caribbean. Approximately 70% of the countries for which data is available are off track in terms of achieving the MDG 1 (eradication of extreme poverty and hunger). Efforts must be made if the region wants to achieve its nutrition target by 2015 (Global Monitoring Report 2012). Given that most of the population growth in the next 30 years will occur in urban areas, the underweight–overweight paradox will probably continue to exacerbate if nothing is done to reverse this trend (Caballero B., 2005).

⁵ See for example the food deserts in the United States that have emerged in supermarket scarce areas (USDA Food Access Research Atlas, 2013).

Micronutrient deficiency

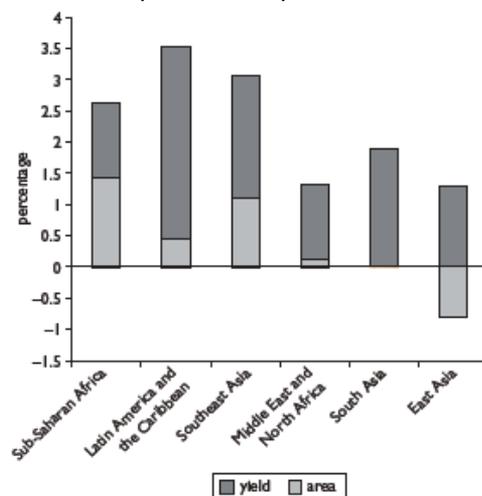
Micronutrient deficiencies are also of public health significance in LAC. According to the WHO (2009b), the prevalence of vitamin A deficiency among LAC preschool-age children is 15.6%, and 4.4% of pregnant women suffer night blindness, a consequence of preexisting maternal vitamin A deficiency. When turning to iron deficiency, anemia prevalence in the region is alarming: 40% of preschool-age children, 31% of pregnant women and 23.5% of non-pregnant women suffer anemia (WHO, 2008). This means that approximately one quarter of women in the LAC region is anemic (United Nations SCN, 2010). Anemia is the most widespread nutritional problem affecting girls and women in developing countries; it is a significant cause of maternal mortality and can cause premature birth and low birth weight. A child born with low birth weight is more likely to experience adverse health outcomes, including neonatal and infant mortality, poor growth and cognitive development, and morbidity due to chronic diseases later in life. As much as half of all children stunting occurs in utero, highlighting the critical importance of better nutrition for women and girls (The window of the first 100 days and Save the children, 2012).

Low income, limited access to diverse diets, and food habits all contribute to micronutrient deficiencies. As seen in previous sections, micronutrient intake is highly correlated with incomes but increased incomes do not automatically lead to improved nutrition. Factors such as knowledge about nutritious diets and access to diverse diets across seasons are important for nutrition outcomes (FAO, et. al., 2012,). Experience shows that micro nutrient intake can be higher among groups with access to adequate and diverse diets, regardless of incomes. Farmers in some countries have shown more diversified dietary intake than their urban equivalents (World Bank and World Food Program, 2012). However, this is not the case in LAC, where a disproportioned share of the undernourished resides in rural areas.

The agro-ecological endowment and high levels of agricultural productivity have better equipped the LAC region to scale up its agricultural output in the future (Figure 11) and WB, 2012b).⁶ The region revealed a comparative advantage index in agricultural production of 2.2, where 1 represents the global average (Anderson and Valdes, 2008). This has transformed LAC into the most integrated region in the world markets, in terms of both export and import ratios (Figure 12) and von Braun and Diaz-Bonilla, 2008). Agricultural exports in LAC increased almost threefold in the period from 1995 to 2009 (WB 2012b), and together with the recent rise in food prices, has led to a shift in the composition of crops grown. In recent years biofuel production has taken a growing share of the region's agricultural production as it has become increasingly attractive due to soaring energy prices. As a result of all these factors, LAC has been specializing on international agricultural markets resulting in a concentration of its agricultural exports. A recent estimation of this concentration using the Gini coefficient shows an increase from 0.69 in 2000 to 0.73 in 2008 (WB 2012b).

⁶ The LAC region has the highest level of agricultural productivity within developing countries with an overall level 7 times higher than China (3,500 and 500 in constant 2000 US\$, respectively). Agricultural productivity is measured by the agriculture value added per worker (WDI).

World Area Expansion and Yield Growth (1990–2007)

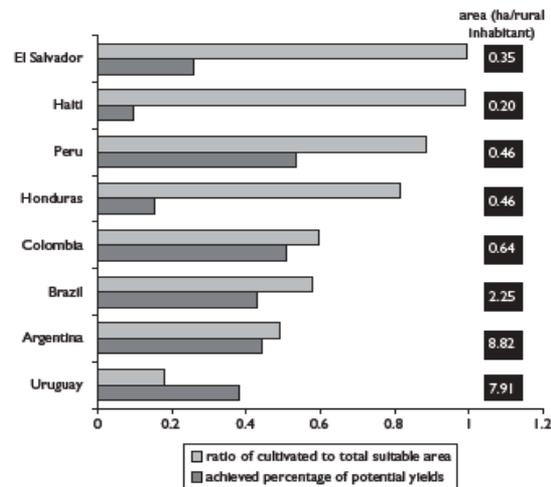


Source: Deininger et al., 2011

The LAC region seems to be in a nutritional-agricultural paradox, reflected by the quantities of food supplied into the world market and the quality (nutritious value) of food accessible to the most vulnerable populations at home. LAC's socioeconomic and demographic dynamics shows that the urbanization process has shifted from two-thirds of the population living in rural areas, in the middle of the past century, to more than three-quarters living in urban areas today. In more urbanized countries, the availability of cheap, energy-dense foods facilitate the consumption of more empty calories relative to expensive healthier food (Caballero, 2005). The problem is also present in rural areas that are not well integrated to local food markets and/or where agricultural specialization may have increased incomes but reduced the availability and affordability of diverse diet.

The increase in international food prices and food price volatility also has a direct impact on food insecurity and nutrition in LAC. Even if in general, low-income food-deficit countries are the most vulnerable to international commodity price increases, poor households living in net agriculture exporting countries can also be net food-consumers (World Bank, 2011). For the poor net food-consumers, food costs take up a substantial part of the household's budget. So when prices rise or fluctuate, the portion taken up by essential staple foods increases at the expense of costly nutrient rich foods such as vegetables, fruits, and pulses (Bouis, 2011).

Yield Gap, Availability of Uncultivated Area, and Area Cultivated per Rural Inhabitant



Source: Deininger et al., 2011

The increase of LAC’s agricultural exports has improved the quality of production meant for export due to the need to conform to international standards and increase food quality demand from high income food importing countries in order to enter developed countries’ markets.⁷ However, it seems that the quality spillovers to domestic markets and particularly to the most vulnerable households have been very limited. Very few initiatives or investments have been made in LAC to develop domestic food safety norms and regulations to promote healthier and more nutritious food at the local level. Domestic consumers are in many cases unable to identify the more nutritious and safer foods. When they can identify the certification, such as for example organic or fair trade, transform it in an unaffordable good for local population.⁸

Several opportunities exist in LAC’s agricultural sector to create local spillovers from increasing the quantity and quality content of food production to improve the nutrition status of the most vulnerable. Project managers and policy makers have the opportunity to simultaneously tackle LAC’s agriculture investment needs and nutritional challenges. The lack of data to better understand potential linkages between agriculture and nutrition (Gillespie et al., 2012) has been a challenge and there is an immediate need to increase the number of surveys (including quantitative and qualitative data covering production, consumption and price patterns). Research in this area has identified based on past experiences and on-going initiatives several areas of opportunities to mainstream nutrition and agriculture.

IV. Steps towards designing nutrition-sensitive agriculture interventions in LAC

When nutrition considerations are taken into account by policy makers when designing agricultural policies and programs, these would be considered “nutrition-sensitive” interventions. After the decision to include nutrition activities or components has been made, and during project design, explicit nutrition objectives could be added to the traditional agriculture-sector project objectives such as increase in income and productivity. Also, appropriate nutrition indicators should be identified in order to monitor

⁷ Developed countries’ non-trade barriers are mainly based on sanitary and phytosanitary criteria.

⁸ See for example the recent case of the Quinoa in Bolivia:

http://www.nytimes.com/2011/03/20/world/americas/20bolivia.html?_r=0

the proposed activities and to evaluate the impact of the agricultural interventions on nutritional outcomes.

The first suggested step is for projects' social assessment to include the identification of nutritional problems and opportunities for including nutrition-sensitive activities in order to increase the projects' nutritional impact. Depending on the initial program's objective and target area, a nutritional profile of the most vulnerable groups (often women, landless households, indigenous communities, autarkic communities, etc.) should be done. The social assessment should provide a diagnostic to understand the nutritional problem at hand (obesity, micronutrient deficiency, stunting, anemia, etc.) and the specific constraints related to the nutrition problem faced by the vulnerable groups to be targeted by the project. The social assessment would thus recommend specific actions to better address the nutritional problem in terms of activities, roles and responsibilities. This is not to say that an agriculture project should become a health project, but that it should be nutrition-sensitive to address and complement ongoing or planned nutrition interventions, as well as adjust activities to maximize the nutritional impact. Finally, a Monitoring and Evaluation system (M&E) should be designed and the skills of the counterpart agency in charge of the execution and supervision should be assessed.

As a result of the social assessment, the various activities (if any) to maximize the nutritional impact of an agriculture project could be grouped in the following two areas: i) investment in women; and ii) increase of all year-round access to high-nutrient content food.

i. Invest in women

Women are most often the food and care providers of rural households and in particular for children. (Cramer and al., 2010). There are already several initiatives and approaches to improve and invest in women as part of agriculture interventions (16 IDA-financed operations already require specific targeting to reach women), and focusing on women can have a direct effect on the food diversity intake and nutritional status of the family. However, given the diversity of agriculture programs in the LAC region implemented in very different contexts and with different objectives, there is no model or set of recommended interventions for female empowerment. However, Box 3 lists some examples of actions that can improve families' nutritional status through female empowerment.

In certain regions in LAC, women are important contributors to livestock production activities, from feeding to selling products. Investing in rural women can therefore be a way of increasing the production of livestock and foods of animal origin (meat, milk, eggs), which are an important piece of a healthy diet. Furthermore, a recent FAO study argues that women livestock keepers must be recognized as the major actors in efforts to stop the decline of indigenous breeds, crucial for rural food security and animal genetics (FAO, 2012). Particular attention could be drawn towards promoting and advertising the production, marketing and consumption of nutritious foods grown by women groups.

Women can play a key role in efforts to undertake nutritional education. Nutritional education for vulnerable families could have a great impact in solving the nutritional problem of the LAC region, as the primary problem is not quantity, but rather quality of the caloric intake. Given their direct link with the nutritional status of the family, women should be at the center of such nutrition education/extension programs. Starting early and including cooking and nutrition in elementary school curricula has also proven effective to improve knowledge and change approaches to new foods and dietary habits.

ii. Increase access all year-round of high-nutrient content food for the most vulnerable

Quality food needs to be accessible all year-round in order to have an impact on nutritional status of the vulnerable population. Social safety nets and other programs that aim to reach the poor and food insecure households are an important mechanism to sustain local investments in food quality. Many social programs in LAC that provide support in the form of cash and/or vouchers to vulnerable families could be

an important incentive to invest in food quality. The same applies for linking agricultural beneficiaries to social safety nets or schools (i.e. school feeding, food aid programs, etc.)

Linking local food production to social safety nets, food aid programs, school feeding initiatives can provide incentives to the market to sustain agricultural investment in food quality beyond project closing. Creating demand for such high quality nutritional food products (even if it represents a small percentage of the overall food consumed), can transform the local food supply towards higher quality food, creating long-term spillovers on the rest of the society that would have integrated and understood the benefits, in terms of income and health, of better food quality.⁹ Furthermore, social programs would also increase their expected benefits in terms of nutritional outcomes, as they would guarantee that the support provided increases directly the nutrient content of households' diets and preserves those households from future nutritional problems.

Such programs linking local food production to social safety nets have already been implemented with success in Brazil as part of its Zero Hunger program, which had the objective of eradicating hunger and extreme poverty. Two components are particularly interesting: i) Brazil's Food Acquisition Program, which allows the public purchase of food items from targeted family farmers, without a competitive bidding process, for distribution in the social assistance network and to build a strategic food reserve; and ii) the National School-Feeding Program, which requires that 30% of school-feeding budget be used for purchasing family farming production. Zero Hunger program resulted in a drop of 37.8% in hospital admissions due to undernourishment between 2002 and 2005 and achievement of the first Millennium Development Goal in 2006¹⁰.

Schools feeding initiatives, such as Centronia¹¹ in the US, are a great vector to ensure demand for local food products, high food quality for schools and allow at the same time a change in the nutritional family behavior. This program has been supported by USDA in the last years and has shown very positive results.

A very innovating pilot conducted by IFPRI and WFP in Ecuador tested the efficiency of food vouchers relative to the distribution of food or cash. The program conditions the use of the voucher on a diversity of nutrient rich foods that had a large impact on several food security indicators (HDDS, 5%, DDI, 16%, FCS, 16%). Food Vouchers also had higher impact than the other modalities on the diversity of food groups consumed and on the social capital, notably increasing individuals' confidence and participation in community groups

V. Opportunities for mainstreaming nutrition into agriculture in LAC

There are several opportunities to mainstream nutrition into agriculture policies and investments in the LAC region. These opportunities can be grouped into policy level opportunities and program and investment level opportunities. Potential interventions include preventive actions and proactive actions such as promoting nutrition outcomes within agricultural projects and investments. The available levers to affect nutrition outcomes through agriculture interventions are numerous, including actions at the farm level all the way to the sector policy level.

⁹ The idea is to use public purchases as a vector to overcome a market failure, which is not allowing the cost of investments on high quality food to be translated into higher prices, des-incentivizing farmers to start and/or pursue such practices after the interventions.

¹⁰ MDG Goal 1: eradicate extreme poverty and hunger (<http://www.un.org/millenniumgoals/poverty.shtml>)

¹¹ Michelle Obama unveiled *Let's Move! Child Care* campaign to work with child care providers to help youngest children get off to a healthy start. Visit <http://www.centronia.org/> for more details..

A. Policy level

Below we list a few levers at the policy level that can be used as opportunities for introducing nutrition into the agriculture sector, building on past experiences of multisectoral work between the agriculture and health sectors.

1. Strengthening intersectoral collaboration to achieve nutrition outcomes

Although nutrition cuts across several sectors, the main responsibility often falls within the Ministry of Health. However, nutrition and other non-communicable diseases are often a low level priority within the health agenda of the country. Furthermore, since agriculture sector specialists often see nutrition as a health issue, and not an agricultural issue, the nutrition agenda within the agriculture sector and intersectoral collaboration are often non-existent. Nevertheless, recent initiatives (such as One Health, a worldwide strategy for expanding interdisciplinary collaborations and communications in all aspects of health care for humans, animals and the environment) and crisis (such as the swine and avian flu) have demonstrated the importance of the agriculture sector for the health of the local and global population. Given the important role that the agriculture sector has by being at the source of the food supply, it can help prevent nutritional problems of the most vulnerable, while at the same time securing their agricultural incomes

The health and agricultural sectors have well-established public institutions Ministries, but they are often not well organized in ways that readily allow for cross-sectorial action. Nutrition and related health problems are the result of several factors and require action across different sectors (social protection, health, education, water and sanitation, agriculture, etc.). Hence, in the absence of strong incentives to develop cross-ministerial policies and programs for food security, sector-specific silos for nutrition will end up favoring one pillar of good nutrition at the expense of the others. There are however examples where such intersectoral coordination has worked, like in the outbreak of certain diseases, and in cases where agricultural extension agents have worked coordinately with health extension agents. This collaboration between extension programs has the potential to enlarge the area of coverage in terms of number of households but also in terms of household members, increasing the probability of achieving behavioral change in health and agriculture practices.

An overall public sector coordination body (interministerial committee) is key to ensure such multisectoral policy and interventions. The Zero Hunger initiative in Brazil is one of the most known coordination initiatives in LAC.

2. Increasing knowledge and awareness of linkages between agriculture and nutrition

a. Capacity at the Ministries of Agriculture

Increase the nutritional knowledge at the policy level by incorporating nutrition experts and training into agriculture policy decision-making. Most Ministries of Agriculture in the LAC region do not have nutrition experts or training on nutrition for Ministry staff. Having access to specialized nutrition experts can ensure that the Ministry of Agriculture takes into account nutritional objectives across its various departments and investments at a relatively low cost. In most cases, as with other dimensions such as gender and environment, mainstreaming nutrition could just involve slight considerations in operational rules and policy incentives.

b. Understanding the linkages between nutrition and agriculture

Given the need for more evidence in LAC on the impact of agriculture policies and investments on nutritional outcomes, data collection and impact analysis need to be prioritized. Monitoring and evaluation systems are crucial for tracking progress, for identifying good practice principles of program design that enhance impact, and for guiding unit costing for scale-up. Data are also essential to provide

feedback to researchers and policy makers to continue improving and adapting solutions for the most vulnerable. Today household surveys have major gaps regarding nutrition and agriculture as they rarely include data on feeding, nutrition and agriculture outcomes, and very few of them allow linking the different sets of indicators if available. Opportunities exist to improve data in order to relate the agro-ecological areas and nutritional and agricultural profiles of the population, such as for example net food buyer/net food seller and nutritional status. Also, food price surveys should include better spatial disaggregation, and product quality differentiation.

A recent systematic review of agricultural interventions that aim to improve the nutritional status of children shows that among the 23 studies that were considered methodologically valid, only one included cases in LAC (projects in Mexico and Nicaragua that involved biofortified maize seeds) (Masset et al., 2012). This provides evidence of the need to increase the empirical analysis of nutrition-sensitive agriculture interventions in the region.

3. Improving the safety and quality of food brought to markets

Improving the food safety regulations is essential to safeguard the health and nutrition of the population. Although other initiatives and efforts are made in the area of food safety (see Box 8 and Box 9 below), it is important to ensure that adequate food safety regulations and implementing institutions are in place as improvements in nutrition quality and consumer awareness can be undone if problems with unsafe food arise. Similarly, guidelines and regulations for good agricultural practices should be in place and promoted by extension services to ensure safe production of food pre-harvest and pre-slaughter. This is important not only to minimize contamination of foods but also to sustain nutrient soils and clean waters – both of which are essential for sustainable safe and nutritious food production. Thus, a comprehensive food safety framework with a “from farm to fork” approach to food safety is a necessary condition to ensure that investments in improving food quality and nutritional content are sustained over time, safeguarding against any individual case of unsafe food.

Provide policy incentives for the private sector to increase the nutritional quality of food and food safety. Opportunities exist for public policies to differentiate subsidy rates providing incentives for the production of nutritional enhanced foods. For example, several countries in LAC have policies to subsidize agriculture inputs (such as fertilizers, seeds, etc.) and adoption of improved technologies (agroforestry, irrigation, soil preparation, etc.). By rewarding the adoption and/or use of nutrition-enhancing agriculture practices and technologies (i.e. zinc fertilizer, biofortified seeds, food fortification, etc.) (Box 10) as well as Good Agricultural Practices, agriculture policy could induce agribusinesses and producers to improve the nutritional content of food and to adopt practices that improve food safety, creating positive externalities in consumer’s health. Although the market initially may not pay for the benefits of improved food quality (such as increasing the zinc content of grains through zinc fertilizers), the benefits to the population (if zinc deficient) could be greater than the investment of the additional marginal cost of using fertilizers with zinc in it. Similarly, publicly funded investment support to the private sector could include selection criteria that benefit nutrition-sensitive agricultural and food-processing investments.

Another potential policy-level incentive is through certification and labeling of foods to reward safety and nutritional content. Beyond the food safety norms and standards that regulate the production, processing and marketing of foods, there is an opportunity to ensure that the labeling of food products inform consumers about nutritional values and thus facilitate social marketing. This can be in the form of nutrition fact labels that list the nutrient amount in the product, or as symbols reflecting the relative nutrition content and dietary value. Important is to develop unified standards and monitor the application of these labels so that they can be trusted by the consumers. Further, with the growth of the natural and health food products, there is an opportunity to ensure that consumers are informed about the benefits and meanings of the different food labels (health, organic, natural, etc.). The identification of higher food

quality products in the market place can allow to target (i.e with vouchers) or condition the transfer (i.e. with cash) for nutritional at risk population.

B. Agriculture program and investment level opportunities

Although this companion note is primarily discussing opportunities for investments and interventions in the agricultural sector, food policy is cross-sectoral and comprises a multitude of diverse stakeholders in the public and private sector. Investment for nutrition-sensitive agriculture and food production, therefore, does not only fall under traditional agricultural investment projects, but also provides opportunities for Community Driven Development Programs (CDDs), Development Policy Operations (DPOs), and private sector development initiatives.

1. Agriculture research and development (R&D)

Enhancing the capacity of regional and national agricultural research institutions to develop and promote new varieties of food products with improved nutritional content. Examples of recent agriculture R&D investments in nutritional quality include biofortification (the process by which the nutritional quality of crops is improved, dovetailing on efforts to enhance agronomic traits through plant breeding). The 2008 Copenhagen consensus concluded that biofortification was the fifth most cost-effective intervention to address hunger and malnutrition. If micronutrient deficiencies are well identified, the development of such crops could improve the intake of iron, zinc, and vitamin A. To create sustainability (i.e. availability from one year to another) and make initial investments in R&D cost-effective, plant-breeding techniques should be always preferred to transgenic techniques. Relative to supplementation and fortification, biofortification offers several advantages. First, it targets food-at-risk households in rural areas. Second, it's cost-effective as after the initial investment in R&D, crops are available all year round. Finally, it's sustainable because it relies on staple crops that people are already accustomed to eat. In LAC, Agrosalud and Embrapa are good examples of research institutions that have been making large progress in the biofortification field.

Agriculture R&D investments also present opportunities to identify throughout the value chain opportunities to increase food quality and/or to avoid nutritional losses and food safety risks. Traditionally, agricultural R&D has been focused on the agricultural production (i.e. pre-harvest) segment of the value chain, so there are many areas of improvement today on the remaining parts of the chain, which have shown to lead to potential high levels of private and social returns on investment (ROI). Understanding the entire value chain of the agricultural products (from the field to the plate) can help private and public sector investments in terms of achieving improved nutritional outcomes for the poorest. Often, such R&D can be conducted in partnership with the private sector (through PPPs). Applied research can focus on the area of post-harvest processes to address local nutritional problems and/or reduce nutrient deficiency and contamination risks in the value chain of the main food products consumed by the most vulnerable. For instance, milk is often consumed in school feeding programs (one glass of milk per child per day) and bought locally. Fortifying milk with needed micronutrients could be cost effective solution to address some of the nutritional problems, producing also spillovers beyond the student population. Scope for R&D can also exist to improve marketability of local foods, in order to maintain nutrient content in the logistics of the product and to maximize shelflife.

2. Agriculture Extension and Information Services

Opportunities exist to increase the nutritional knowledge at the local level by incorporating food security and nutrition modules into agriculture extension training curricula. Extension agents (both private and public) often provide great coverage throughout the territory and a direct link to farmers and rural households. They are readily available delivery channels to promote nutrition among small-scale farmers

and their households, usually the most vulnerable to food insecurity. The skills taught by extension agents could be used to change behavioral habits of producers (and rural households) towards making their agricultural activities (e.g. choice of seeds, Good Agricultural Practices including harvesting and slaughtering, post harvest handling, food preparation) more nutrition sensitive. Including nutrition into the agriculture extension curriculum and modules represents a marginal cost with potential great benefits to bring nutritional awareness to farmers and rural households (See Box 14 for an example on Haiti).

A parallel effort, in conjunction with the Ministry of Health, could be aimed at informing and raising awareness among local consumers about the benefits of nutritional enhanced foods to the health of a family, and thus increase demand for such products. Social marketing and nutritional education could promote and advertise nutritional benefits as well as potential problems. This can be combined with marketing of local agricultural products to generate consumer demand for local production. Labeling and recommendations from the Ministry of Health and/or Agriculture can also be useful in promoting the benefits of sourcing local foods and nutrition-enhanced foods among consumers, restaurants, schools, etc.

3. Linking farmers to markets and strengthening the value chain

Programs that invest in helping farmers link to markets, such as Rural Alliances and Community Driven Development (CDD) type of projects, have the opportunity to provide incentives to improve food quality and safety in value chains by not only linking to markets but to food purchasing programs, like food aid and school feeding.¹² These projects and “alliances” require a clear demand for the food product to be produced (often in the form of a letter of intent from the buyer). Therefore, to promote investments in food quality, projects that help link farmers to markets could: (i) actively help farmer groups to find potential markets that value increased nutritional value of food (having positive spillovers into other markets and consumers); (ii) increase the amount and/or scoring system for those initiatives that show positive nutritional improvement and impacts; and (iii) provide technical assistance related to complying with procurement rules and nutrition expertise for local farmer groups to increase food quality and be able to supply food assistance programs (such as food aid, school feeding, and other local purchases programs).

More traditional value chain approaches that benefit nutrition and food safety involves post harvest handling and logistics. To improve food safety for marketed products, cold storage and transportation together with good hygiene practices in handling and packaging are essential. While some of these measures can be improved through knowledge and changes in routines, other requires relatively large up-front investments, which open up for market failures, especially when agricultural credit is scarce. Public investment project can therefore play a role, either by availing credit or by co-financing through conditional and competitive grants. Similar investments are required to maintain nutrition values throughout the supply chain. The nutritional content in perishable products such as fruits and vegetable quickly declines after harvest and appropriate storage, packaging, and preservation techniques are therefore crucial.

¹² All traditional investments that aim to increase farmers’ access to markets such as infrastructure investment or market promotion are also examples of ways of linking farmers to markets and strengthening the value chain.

VI. Concluding Remarks

Compared to other developing regions in the world, LAC has the particularity of suffering the double burden of over and undernutrition. In some cases, stunted children and overweight adults coexist under the same roof. While undernutrition has been decreasing in most countries of the region in the last decades, overweight has been simultaneously increasing. Countries with low levels of stunting show today high levels of overweight; and the rest of the countries will soon catch up as the steady increase in overweight rates rivals today those of the U.S. and Canada.

Traditionally, agricultural projects have focused on improving agricultural productivity to increase farmers' income and food production. However, the LAC region is probably the best example to show that expanding agricultural incomes and food production is necessary but not sufficient to achieve food security. The increase of LAC's agricultural exports has improved the quality of production meant for export due to the need to conform to international standards and regulations demanded by developed countries; however, the quality spillovers to food products locally consumed by the most vulnerable households have been very limited. Hence, the LAC region seems to be in a nutritional-agricultural paradox, reflected by the increasingly large quantities of high quality food supplied into the world markets that contrasts with the lower quality of food (in terms of variety, nutrient content and safety) accessible to the most vulnerable local populations.

The LAC region is just one-step ahead relatively to the rest of the world that will soon catch up LAC on the overweight problem without necessarily solving the problem of undernutrition (Shrimpton and Rokx, 2013). The region has to innovate in order to show the way in how to rethink the agricultural and food systems, allowing food insecure individuals to access and afford nutritious food all year round. The abundance of agricultural production in LAC, reflected in the high levels of agricultural exports, provides a natural opportunity for the region to relieve its dual nutritional burden.

Many opportunities exist to induce positive effects on the nutritional status of the most vulnerable groups when investing in the agricultural sector. The paper describes instruments that could be used by practitioners to mainstream nutrition in their interventions such as: (i) conducting social assessments to understand the nutritional problems in the area of intervention; (ii) investing in women, the nexus between agriculture, health, and nutrition¹³; (iii) securing demand and incentivizing investment to ensure accessibility and affordability of healthier and safer local food products all year around. Products should be signaled at the markets with a national certification to inform customers but also to target the demand from social safety nets, food aid programs or school feeding initiatives. These tools do not harm any of the objectives of the agricultural sector but at the same time they create a virtuous cycle increasing the nutritional status of the most vulnerable and ensuring sustainability after the end of the interventions.

This paper describes several opportunities to mainstream nutrition into agriculture in LAC, both at the policy and project levels. Given the big interest that the topic of food security is gaining all around the world, many of these opportunities for action already have examples that show how these levers have been put into practice in LAC. Many of these have been mentioned in this paper. These cases should be used as a starting point in the path of learning, which are the best ways to alleviate the dual nutritional burden that is hanging over the region's shoulders.

¹³ Title of the seminar given by Bill and Melinda Gates in the WB headquarters on 10/25/2012. More information at: <https://www.securenutritionplatform.org/Lists/Events/DispForm.aspx?ID=93>

ANNEX 1 - GLOSSARY

Most of the information used in this section is from the WHO and UNICEF.

MALNUTRITION: It is defined as all forms of poor nutrition, including both undernutrition and overnutrition.

UNDERNUTRITION: It is the consequence of insufficient food intake and repeated infectious diseases. It includes being underweight, stunted, wasted or deficient in vitamins and minerals (micronutrient malnutrition)

STUNTING: Stunted growth reflects a process of failure to reach linear growth potential as a result of suboptimal health and/or nutritional conditions. Stunting is traditionally used as an indicator of nutritional status in children. It means being too short for one's age and it is calculated by comparing the height-for-age of a child with a reference population of well-nourished and healthy children. Stunting is a cumulative indicator of nutritional deprivation since birth or conception. It is relatively independent of immediate circumstances, since height does not change much in the short term. The worldwide variation of the prevalence of low height-for-age is considerable, ranging from 5% to 65% among the less developed countries

WASTING: It means being too thin for one's height and it is calculated by comparing the weight-for-height of a child with a reference population of well-nourished and healthy children. Wasting is usually taken to be an indicator of short-term nutritional status, as it reflects a recent and severe process that led to substantial weight loss, usually associated with starvation or disease. Provided there is no severe food shortage, the prevalence of wasting is usually below 5%, even in poor countries.

UNDERWEIGHT: It means having too low weight for one's age and it is calculated by comparing the weight-for-age of a child with a reference population of well-nourished and healthy children. It can be seen as a more comprehensive indicator, as both stunted and wasted children are likely to be underweight. The worldwide variation of low weight-for-age is similar to that of stunting.

Z-SCORES: Weight-for-height, height-for-age and weight-for-age are usually interpreted by using the Z-score classification system. The Z-scores are constructed standardizing the measure as its deviation from the median of the reference healthy population for that age in months and sex, and dividing it by the standard deviation from the same reference population. The Z-score cut-off points are <-2 SD (standard deviations) to classify low weight-for-age, low height-for-age and low weight-for-height as moderate and severe undernutrition, and <-3 SD to define severe undernutrition. For example, a child whose height-for-age z-score is less than minus two but greater than minus 3 ($-2 > Z > -3$) is considered moderately stunted.

OVERWEIGHT and OBESITY - ADULTS: Overweight and obesity are defined as excessive fat accumulation that may impair health. The body mass index (BMI) is an index of weight-for-height that is commonly used to classify overweight and obesity in adults. The BMI is defined as the ratio of weight in kilograms over height in meters squared (kg/m^2). A person whose BMI is greater than 25 is overweight, and greater than 30 is obese.

OVERWEIGHT and OBESITY – CHILDREN: Children above 2 years of age can be classified as being normal weight, overweight or obese using their BMI measures, and the international cut-off points recommended by the Childhood Obesity Working Group of the International Obesity Taskforce: between the 85th and 95th percentiles children are considered overweight and above the 95th percentile, obese.

An alternative classification uses the weight-for-height Z-scores: a child is overweight if he is more than 2 standard deviations above the corresponding child growth standards median, and he is obese if he is more than 3 standard deviations above it.

ANEMIA: It is a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiologic needs, which vary by age, sex, altitude, smoking and pregnancy status. Iron deficiency is thought to be the most common cause of anaemia globally. It is caused by poor diet and can be exacerbated by infectious diseases, particularly malaria and intestinal parasites.

ANNEX 2 – DATA CONSTRUCTION AND SOURCES

The nutritional data are nationally representative prevalence of stunting and overweight/obesity in Latin America and the Caribbean. Source: PAHO's Health in the Americas report 2012 edition.

The food trade data comprises commodities in SITC sections 0 (food and live animals), 1 (beverages and tobacco), and 4 (animal and vegetable oils and fats) and SITC division 22 (oil seeds, oil nuts, and oil kernels). Source: UN Comtrade.

GDP per capita PPP: Gross Domestic Product per capita, based on Purchasing Power Parity (current international \$). Source: World Development Indicators (WDI)-IMF

Agriculture Value Added (% GDP). Source: World Development Indicators (WDI).

Rural Poverty (below \$1.25 a day). Source: World Development Indicators (WDI).

Construction of the nutrition variables

When available data didn't match with the dates, data were smooth (the average was taken) between 2 dates available in the range indicated for each date.

When data was not available for the needed year, the two available nearest data points were averaged to obtain the prevalence rate for the year needed. The nearest data points were selected in the following ranges for each needed year:

1990: 1989-1991. Exceptions for stunting: 1986-1995 (Colombia), 1982-1996 (Costa Rica).

1995: 1994-1996

2000: 1998-2002

2005: 2002-2006

2009: 2007-2010. Exception for stunting: 2006-2010 (Ecuador),

The **"last available year"** for the nutrition indicators

- Overweight: 2005-2010. Except for Guatemala (2002) and DR (2002)
- Stunting: 2006-2010. Except for Haiti (2005) and Panama (2003)

The **"first available year"** for the nutrition indicators:

- Overweight: 1989-1996. Except for Haiti (2000) and Honduras (2001)
- Stunting: 1989-1996. Except for Ecuador (2005)

Growth from the 1990 to the last available data for the nutrition indicators: It is the percentage change between the first available and the last available year.

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