A collaborative approach to Monitoring and Evaluating the Impact of Agricultural Projects on Nutrition

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ABSTRACT

The monitoring and evaluation (M&E) of agricultural projects for their impact on household food insecurity and nutrition is important, given the paucity of data documenting successes and failures in such projects, and because of the need to rapidly address possible adverse effects in such projects. Recognizing, however, the lack of capacity and/or reluctance of some agriculture project managers and planners to incorporate nutrition in their management information systems, a feasible alternative approach is needed, one capable of meeting agriculture-nutrition M&E objectives without encumbering project managers. To help overcome this, external teams of skilled individuals could carry out M&E for food security and nutrition. Baseline and monitoring data should indicate (a) the extent to which households and individuals within households have been reached by the project, (b) household food insecurity levels, dietary quality, and/or market-level indicators of food availability and prices, (c) women's empowerment, (d) the health and sanitation environment, and (e) where appropriate, nutritional status. Additional data of primary interest to project managers also would be collected. Although ownership of nutrition issues in the field of agriculture is desirable in the long term, this approach offers a short-term means of assessing and learning from the nutrition effects of these agriculture projects in the immediate term. This is particularly important in the current environment of increasing interest in improving nutrition impact from such projects.

Keywords: monitoring and evaluation, nutrition-sensitive, agriculture-nutrition linkages

INTRODUCTION

The monitoring and evaluation (M&E) of agricultural projects for their impact on household food insecurity and nutrition is important, because the existing paucity of data documenting successes and failures in such projects is preventing important lessons from being learned, and because possible adverse effects in such projects need to be identified and addressed rapidly (Levinson 2011; Herforth et al. 2012). Over the last two decades, a series of reviews focused on projects explicitly aiming to link agriculture and nutrition indicated the need for stronger methodological designs in future evaluations (Ruel and Alderman 2013; Masset et al. 2012; Webb Girard et al. 2012; World Bank 2007; Berti et al. 2004; Leroy and Frongillo 2007). One of the key improvements identified was to focus on measuring the outcomes agriculture projects are designed to affect, which is not usually child nutritional status impact within the scope and time frame of most projects (Herforth and Ballard 2016). Earlier literature looking broadly at agricultural commercialization projects found limited impact on child nutritional status, but did not assess more proximal factors such as dietary quality or food security (von Braun and Kennedy 1994). Dietary quality and food security were often not measured in earlier impact evaluations because feasible tools and methods for measuring them did not yet exist. As tools, methods, and understanding of impact pathways has improved, it is important to assess food security and nutrition impacts not only in projects that are focused primarily on improving nutrition, but also in more conventional production-oriented projects that may have been justified partly on the basis of an assumed potential contribution to food security and nutrition.

The idea of nutrition-sensitive agriculture has captured the attention of a growing number of agriculturalists. In 2010, the Scaling Up Nutrition (SUN) movement identified the need for nutrition-sensitive development through agricultural investments; it has been the topic of dozens of publications by international development institutions, most of them published since 2008 (FAO 2013); and several bilateral agencies have continued to support agricultural programs that explicitly seek to improve nutrition (e.g., USAID's Feed the Future). Despite over a decade on the agenda, the large majority of agricultural investments and projects still do not clearly seek to address nutrition, and nutrition-sensitive agriculture has not yet been consistently operationalized or measured by agriculture project planners and managers.

Explanations for this are not difficult to discern. With funding for agricultural development in low-income countries still inadequate, agriculture planners are hard pressed to generate adequate resources for their projects. Given internal pressures on these projects to increase the production of particular commodities and to generate increased income for their producers, project managers are, not unexpectedly, reluctant to add additional dimensions to their projects, despite pressure from interests related to environment, gender, and nutrition.

Agriculture project planners and managers often face considerable difficulty with M&E, even with their existing limited orientation. An FAO and World Bank analysis found agriculture project M&E efforts riddled with many of the same problems plaguing development programs more generally: (a) externally imposed obligations, but with findings rarely integrated into operational systems, (b) unmanageable data collection and

reporting demands, (c) primary attention to the delivery of goods and services rather than project outcomes, and (d) inadequate institutional capacity (Muller-Praefcke et al. 2010).

With this panoply of problems, agricultural planners and managers are less than eager to include additional elements in their M&E systems. Yet the agricultural sector is among the most important in its effects on nutrition, and much can be learned from programs currently being funded.

In the long term, agriculture strategies and lending portfolios should be reviewed with a food and nutrition security lens, and fully integrate nutrition objectives and appropriate indicators into all projects and agriculture M&E systems. Such recommendations have been described elsewhere (World Bank 2014; World Bank 2013; Herforth et al. 2012). However, recognizing the existing constraints in agriculture M&E and the traditionally lower prioritization of nutrition-related issues in agricultural planning, there may be value in examining alternatives to incorporating nutrition indicators into mainline agriculture project management information systems in the short term. The objectives of this paper are to propose (1) an alternative solution that may be implemented in the immediate term to glean valuable information from current agriculture projects, and (2) identify key areas of information that a nutrition-sensitive M&E system would need to collect.

TYPICAL AND ALTERNATIVE APPROACHES

In the current environment, many organizations have committed to nutrition-sensitive agriculture. In November 2014, during the Second International Conference on Nutrition (ICN2), FAO and WHO Member States reaffirmed their commitment to the Rome Declaration on Nutrition and its Framework for Action which specifically emphasizes the importance of "reviewing national policies and investments and integrating nutrition objectives into food and agriculture policy, programme design and implementation" (Scaling Up Nutrition 2014, FAO 2014). Commitment to nutrition-sensitive agriculture has also been expressed by IFAD (IFAD 2015), by the World Food Program (WFP 2017), and by the World Bank, and has been emphasized by the UN Decade of Action on Nutrition (2016-2025) and Food Systems Summit (2021).

At the same time, few resources exist to design and evaluate agriculture programs to ensure positive effects on nutrition. Typical approaches include either (a) failing to measure food security and nutrition impact at all, or (b) tasking project managers with the inclusion of nutrition measures in their baseline and endline surveys, where they assume responsibility for the impact of the project compared to pre-defined objectives. Neither of these typically capture the information that would be needed to enable learning about nutrition impact, or lack of impact, from the substantial agriculture investments being made.

So far, donors and non-profit organizations have focused on building the evidence base from agriculture-nutrition projects that explicitly seek to improve nutrition. Donor funds could further enhance the evidence base by using some funds to evaluate larger agriculture investments that may affect nutrition, but for which nutrition is not necessarily a primary

goal, such as those rolled out by bilateral, multilateral, or government organizations. It should be noted explicitly that not all agriculture projects have the potential to affect food availability in markets or nutrition or food security of households and individuals, and that those projects without potential should not be considered for nutrition M&E.

The monitoring and evaluation of the nutrition and food security dimensions of nutrition-sensitive agriculture projects should seek to accomplish the following:

- Provision of high-quality data on the food security and nutrition effectiveness of nutrition-sensitive agriculture projects, making sure, at the same time, that up-to-date monitoring of data on the delivery of project services (activities and outputs) and on intermediate outcomes (e.g., progress in generating income, increasing production, and expanding production diversity) is being collected through the project's management information system. As indicated below, the cooperation of the project management team will be vital in making this assessment as it will be in multiple aspects of the process.
- Assuring that the collection and analysis of such data does not make agriculture project managers feel overly encumbered by the process;
- Provision to project managers of valuable up-to-date information on other core objectives in their projects, in addition to food security and nutrition information, where the additional information is easy to collect and lends itself particularly to sentinel site collection. This acknowledges that food security and nutrition improvement go hand in hand with environmental and economic sustainability, objectives which are often of core interest to agriculture program managers. The provision of such data to project managers also can help to solidify relationships with them.

One possibly expedient means of accomplishing the above is to provide external technical assistance for the monitoring and evaluation of agriculture programs. This could be accomplished either through representative sampling of the entire impact area, as in a typical evaluation study; or through the establishment of sentinel sites within the overall project area that function more as a monitoring mechanism to feed back into program delivery. Sentinel sites have long been used in public health to evaluate trends and determinants of uptake, and to monitor performance of interventions[1], and have been used in the USAID-funded Nutrition Innovation Lab project to examine behavior change communication. (See, e.g., Nutrition Innovation Lab 2015.) Data would be collected by staff external to the project, and would not be included in the project's formal management information system. Sentinel site surveillance, to date, has been utilized more frequently in public health programs than in food and agriculture undertakings, although the Government of Indonesia uses sentinel

[1] In the case of CDC Immunization Information Systems (IIS) sentinel sites, immunization programs in the U.S. actually apply and compete for selection as official sentinel sites and the requisite funds. There is a requirement that applying programs use their entire IIS geographic area or identify an appropriate sub-population with at least 85 percent of the <age 19 population participating in the IIS (CDC 2015). The WHO Global Rotavirus Surveillance Network is made up of 178 sentinel sites in 60 countries which provide data according to a standardized protocol on disease trends and changes in circulating strains at pre-determined intervals (WHO 2014).

sites in its Food and Nutrition Security Monitoring System, and agricultural crop modeling work often uses such sites for calibration and evaluation. The value of sentinel sites can be particularly important when high-quality data are needed that will be more difficult to obtain without a concentration of well qualified staff and high-quality data collection. Data collected in a well-designed sentinel system can be used to signal trends and permit a rapid, economical means of addressing identified problems as they arise.

Nutrition-sensitive M&E could be undertaken at two levels. One would be at market level, to observe changes in the availability or prices of foods, in particular any that are targeted by the project. Some agricultural value chain projects have nutrition objectives but do not include households as direct beneficiaries. For these types of projects, their impact could be monitored and evaluated using market-level data. It should be noted that goals of agricultural value chain projects vary, some focused on increasing production of foods, in addition to or rather than targeting vulnerable producer households. Accordingly, it is important to measure effects at the appropriate level, which may be in communities or markets instead of households. Monitoring the cost of healthy diets (Herforth et al. 2020), or other measures of the food environment (Herforth and Ahmed 2015, Ahmed et al, 2021), may be useful to capture impact in such projects.

Other projects directly influence farming households and/or individuals, by providing training, inputs, or other services. The remainder of this paper focuses on M&E at household level.

Whether representative sampling or sentinel site monitoring are used, they must be in locations where the project is fully operational. Within project areas, they should be selected based on representativeness of the beneficiary population in terms of assets/wealth, household size, and market access. The total population surveyed would need to be geographically representative, and would need to include large enough samples to have statistical power to observe impact on key variables identified. Power calculations will vary based on the baseline prevalence of a particular indicator, and the amount of change expected.

This still leaves the question of attribution, i.e., the extent to which any food security and nutrition changes are indeed the result of the project. In many projects, examining changes from pre-project baseline data can be adequate to ensure that the expected changes are positive, and not negative, for food security and nutrition (Habicht et al. 1999). There may be value, in larger projects, however, in collecting this periodic food security and nutrition data from comparable comparison populations not in the coverage area of the agriculture project under review. Comparing changes over time in program and comparison groups constitutes a more robust evaluation design that allows more reliable attribution of impact.

The skills necessary to organize such a system, and to collect food security and nutrition data are rarely available among agriculture project staff (even if there were an inclination to incorporate such a system internally). Accordingly, it is suggested that teams with nutrition-sensitive agriculture project M&E skills (heretofore referred to as M&E teams) be contracted with external support, prior to project initiation, to undertake these tasks, working closely with local agriculture staff in initial projects. In addition, it would be

beneficial, where possible, for the agriculture-nutrition M&E teams to be available to support nutrition-sensitive program design, or at a minimum program adjustment as suggested by M&E data.

Data to be Collected

Once data collection systems organized, prior to project initiation the M&E team would collect baseline data and, where possible, from comparable non-project samples or sites. This would be followed at intervals (six months for most measurements) by the collection of the monitoring data indicated below. In addition to basic socio-demographic information, this monitoring data falls into several categories, several of which are covered in the FAO compendium of nutrition-relevant indicators for use in agriculture projects (FAO 2016)[2]:

A. Information indicating participation and the extent to which households have been reached/affected by the project
B. Data on household food insecurity levels and on diet quality, or market-level indicators of the food environment
C. Data on child and maternal nutritional status, where appropriate
D. Information on women's empowerment (qualitative and quantitative)
E. Information on the health and sanitation environment
F. Data on a subset of indicators of primary interest to project managers.
G. Qualitative information on any other beneficial or harmful effects of the project on food security or nutrition.

Specific data on these are enumerated below.

A. Information indicating participation and the extent to which households have been reached/affected by the project

One of the oversights of past agriculture-nutrition research has been the failure to report data on participation and program reach (Masset et al. 2012). It is important to know which households, and which individuals within households, are participating in the project, and whether the program inputs are reaching the targeted households or individuals as planned. As examples:

a. If the project seeks to generate employment, have previously un- or underemployed individuals been employed?
b. If the project is providing inputs (free or subsidized) to small producers, are the food insecure households being included?
c. How does participation and satisfaction differ by gender?
d. How do participating households compare to non-participants?

B. Data on household food insecurity levels, dietary quality, and food environments

In the case of most agriculture projects, positive effects on household food security and

[2] Other authors have proposed a minimum set of nutrition data required in agriculture surveys, including anthropometric, biochemical, dietary diversity, and market-level food supply (Pingali and Ricketts 2015). We similarly propose that dietary quality and market-level food supply information is needed, and in addition we suggest data on household food security, women's empowerment and program participation; and we view anthropometric and biochemical indicators as optional depending on the program's scope, size, and duration.

diet quality may be more readily achieved than effects on child nutritional status (Herforth and Ballard 2016). Agriculturalists are also more likely to be able to relate to these effects than to nutritional status, which, additionally is affected by other non-agriculture, non-food influences including health status and infant and young child feeding practices.

No single indicator can measure food security completely, but two types of indicators are particularly relevant to measure food security: experience-based indices, and cost of healthy diets in the market compared to household food expenditures. Experience-based measures are often used, in particular the global Food Insecurity Experience Scale (FIES) (FAO et al. 2021). The Cost and Affordability of a Healthy Diet (CoAHD) is the newest addition to globally implemented food security indicators, capturing the aspect of economic access to "nutritious food to meet dietary needs" (FAO et al. 2021).

Food consumption effects, including diet quality of nutritionally vulnerable household members, are often the primary means by which agriculture projects may influence nutrition. While some food consumption indicators would be project-specific, projects can employ validated indicators of diet quality to enable comparability of results across projects. One example of a diet quality indicator is the Minimum Dietary Diversity for Women (MDD-W), which has been validated as an indicator of micronutrient adequacy of the diet for women of reproductive age (FAO 2021). Other indicators of dietary quality, or of the consumption of targeted nutrient-rich crops (Feed the Future 2014) will depend on the project design. Several of these indicators, including MDD-W, may be captured through new country-specific diet quality questionnaires (DQQ) that were designed for use in rapid assessment without requiring nutrition expertise to administer (Global Diet Quality Project 2022). Market level indicators of the food environment may be necessary in some projects, relating for example to the marketability of crops produced or other market linkages.

C. Information on women's empowerment (qualitative and quantitative)

It has been clearly shown that ensuring women's participation and access to productive resources and information can substantially improve agricultural productivity (FAO 2011). Since women's empowerment is also a key driver of improved nutrition (FAO 2013), information on women's participation, time use, perceived returns on their labor, discretionary income and decision-making power are important. Some quantitative indicators are available such as the Women's Empowerment in Agriculture Index (Alkire et al. 2013; Quisumbing et al. 2022), although much of this information is still most effectively obtained qualitatively, through interviews or focus groups.

D. Information on the health and sanitation environment

Agriculture projects often affect water systems, the presence of animals near humans, and other factors that may affect disease risks in the project area. These are relevant to health and nutrition and should be monitored where the project may affect them. Data could include:

- Availability and quality of water used for household consumption, e.g., percentage of population using an "improved" water source (WHO and UNICEF 2015), Household Water Insecurity Experience Scale (Young et al.

2021).
- Risk of water vector-borne diseases, and mitigation steps taken.
- Presence of animals and animal feces near or in living spaces.
- Use of agrochemicals or of their containers for food/drink storage.

E. Data on a subset of indicators of primary interest to project managers

Working at the sentinel site level, the collection of particular types of data of value to agriculture project managers may be easier to collect than through traditional agriculture management information systems. Collecting, analyzing and reporting such information to project managers on a regular basis is not only likely to enhance overall project effectiveness, but will also strengthen relationships between project management and the M&E team.

Valuable data which particularly lends itself to collection at sentinel sites includes that listed below. A portion of this quantitative data collection should be accompanied by the collection of qualitative data to better understand the local context and dynamics of project effects:

- percentage of households considering themselves better off now than 12 months ago
- percentage of the labor force underemployed or unemployed
- access, use and satisfaction with services provided under the project
- changes in farmer income
- productivity of farm products

F. Data on Nutritional Status

While recognizing that changes in nutritional status may not result directly from agricultural projects, it may be warranted in some cases to measure anthropometric data on children and/or women, mainly to understand the nutritional situation of the area and to ensure no harm to the nutritional status of vulnerable groups (infants, young children, women) is taking place. These indicators (e.g., stunting, wasting, Body Mass Index (BMI)) may be more likely to be affected where agriculture programs are taking place in conjunction with health, water and sanitation, social protection, or education initiatives, and where pathways from the intervention to nutritional status are well-specified and targeted.

G. Information on any harm to food security or nutrition emanating from the project

The most useful aspect of regular monitoring of sentinel sites may be to ensure, through analysis of data trends and through qualitative information and observation, that harm is not being done unintentionally. The information listed above, most of it collected at six-month intervals, is likely to help identify harmful effects on food security or nutrition resulting from the project. Overall, harmful effects emanating from agriculture projects (ideally with effects compared to control areas) may include any of those enumerated (according to type of data collected) in the table below:

Possible Harmful Effects of Agriculture Projects (by type of data being collected)

Section A: Participation	• Small producers may be excluded • Women may be unable to participate
Section B: Food Security and Diet Quality	• Household food security and diet quality may deteriorate, overall or seasonally
Section C: Time Constraints Inhibiting Child Caring Practices and Women's Self-Care	Risks include: o Reduced breastfeeding o Lower quality diets and care/hygiene for young children o Reduced schooling for older sisters o Compromised rest and food consumption for reproductive-age women
Section D: Women's Empowerment	• Intra-household equality of income may decline
Section E: Health and Sanitation Environment	(i) In irrigation/water use projects o There may be changes in water-borne diseases; (ii) In livestock projects: o There may be changes in exposure to zoonotic disease; (iii) When agrochemical inputs are used o There may be possible risks to health (e.g., using empty containers for drinking water)
Section F: Economic and Other Indicators of Primary Interest	• The debt burden of vulnerable households may increase • Employment levels may remain static or deteriorate
Section G: Nutritional Status	• Women's underweight may increase for various reasons, including some related to agriculture, e.g., if the labor burden of women increases

DISCUSSION

Conditions for success

An important condition for the success of these cooperative efforts toward learning from agriculture projects and improving their impact on nutrition, is that good quality data can be sensibly aggregated and presented to project management in timely fashion. Furthermore, it is essential to have an explicit understanding that harmful effects identified by M&E teams – or data indicating shortcomings in project implementation – be directly and seriously addressed by project management, and that the M&E teams are prepared to initiative implementation of mitigation plans in cases of harmful effects.

External M&E teams can enable greater learning from agriculture projects, and reduce the pressure on agriculture managers to collect large amounts of data and assume responsibility for a wider variety of impacts. Whichever approach is taken, adequate staff and funding are still needed. There is a need to identify agriculture-nutrition M&E teams capable of utilizing this approach in an initial stream of nutrition-sensitive agriculture projects. Additionally, agriculture projects with potential food security and/or nutrition impact often do not conduct household surveys. Thus, an auxiliary system to capture

household-level impacts is an alternative to re-structuring agriculture projects' M&E systems in the short term; although, in the longer term, agencies investing in nutrition-sensitive agriculture should improve their accountability by increasing their use of household surveys to capture nutrition and food security information.

One of the challenges in this approach, as in any multisectoral M&E effort, is to collect data that are meaningful, yet sufficiently compact to permit feasible and timely collection, analysis, and reporting. This is particularly important for sentinel sites where respondents would be contacted often and cannot be overburdened with long questionnaires, and findings must be timely enough to allow program managers to adjust program implementation accordingly.

CONCLUSIONS

This paper makes the case (a) that nutrition-sensitive agriculture is of major importance in efforts to reduce food insecurity and malnutrition; (b) that monitoring and evaluating such projects can yield valuable information about current investments; (c) that, despite major international attention and active support from nutritionists and many agriculturalists, the absence of buy-in from agriculture project planners and managers coupled with existing challenges in agriculture project M&E call for an alternative solution in the short term, an alternative collaborative approach that could help overcome currently experienced constraints to the implementation of improved M&E in agricultural projects. In the longer term, evidence may reveal positive economic and food security outcomes of nutrition-sensitive projects, which, in turn, may increase interest and willingness to incorporate relevant indicators in future projects.

We propose that external agriculture-nutrition M&E teams could be funded to glean important learning on the nutrition impacts of agriculture programs, even those that were not necessarily designed to improve nutrition. Such data collection would be complementary to the project's management information system. Careful attention to these processes will permit the development of data collection system prototypes and protocols for subsequent staff training. These, if accompanied by general successes in initial nutrition-sensitive project operations, should permit solidified systems for such M&E undertakings in the future.

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