Emergency vegetable seed interventions

CAN WE EXPECT IMPROVED NUTRITION OR INCOME GENERATION AMONG BENEFICIARIES?

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CFW  Cash for Work
CIAT  International Center for Tropical Agriculture
CRS  Catholic Relief Services
CSI  Coping Strategies Index
DDS  Dietary Diversity Scale
DEC  Development Experience Clearinghouse
FAO  Food and Agricultural Organization
FFCS  Food Consumption Score
HFIAS  Household Food Insecurity Access Scale
HHS  Household Hunger Score
SPI  Seed Programs International
UCT  Unconditional Cash Transfers
USAID/US  United States Agency for International Development/ US Office of Foreign Disaster Assistance
VSLA  Village Savings and Loans Associations
WASH  Water and Sanitation Hygiene
WorldVeg  World Vegetable Center (formerly known as AVRDC)
WFP  World Food Program

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Introduction

Seed interventions have been an important component of emergency response programs for decades: increasingly, practitioners are diversifying from staple crop seed deliveries to include vegetable seeds as well. Vegetable seed is justified as a way to quickly improve diets and provide fast income to farmers in stress situations. Although researchers and development practitioners are beginning to investigate vegetable production as a strategy to improve livelihoods under non-emergency situations, little to no research or investigative work has been done on emergency vegetable seed programs.

This report uses literature review, interviews with experts, document analysis and case studies to examine two hypotheses currently circulating among emergency practitioners.

- Vegetable seed interventions lead to better family nutrition during a crisis
- Vegetable seed interventions help families generate income during a crisis

We analyze existing literature on emergency vegetable seed distributions through the lens of these two hypotheses and summarize current practices as shared by experts in the field. Two case studies provide insight into the challenges experienced on the ground when trying to implement emergency vegetable seed deliveries. We conclude by formulating recommendations for programs wishing to maximize their impact on nutrition and income. An important introductory note is that we enter the vegetable emergency seed discussion through the lens of home gardening. While the two are not synonymous, most practitioners recommend that even emergency vegetable seed distributions be accompanied with a garden training program.

This document has five parts: a Background section, explanation of the Methods used, a discussion of the major Findings, suggestions for appropriate Indicators, and a discussion of Best Practices. Case Studies from Niger and India are included in the Appendices.

Background

Academic literature demonstrates that home garden programs have had a significant impact on beneficiaries’ consumption of nutritious foods and are frequently used by households for surplus income generation, but programs need to be well designed to achieve this impact.

Home garden programs have been shown to increase dietary diversity, but these improvements have not generally led to significant improvements in important nutrition outcomes.

Research has established strong correlations between crop production diversity and dietary diversity (Dillon et al., 2015; Jones, 2014; Kumar et al., 2015; Shively and Sununtnasuk, 2015)
and between dietary diversity and improved nutritional outcomes (Arimond and Ruel, 2004). It is often assumed that these observed correlations will translate to a causal relationship, and projects promoting greater crop diversity will result in improved nutrition. Reviews of agricultural interventions aiming to improve nutrition have shown a rather weak causal relationship however. Cumulatively, agricultural programs have failed to significantly impact nutrition outcomes such as stunting, underweight, and wasting even as these programs improve dietary diversity (Girard et al., 2012; Masset et al., 2012; Ruel and Alderman, 2013).

**Home garden interventions are often more successful at increasing dietary diversity if they use a multi-pronged approach.**

Home garden programs have successfully increased maternal and child consumption of micronutrient rich foods, even if these dietary improvements have not consistently led to improved nutrition outcomes (Girard et al., 2012; Olney et al., 2015; Schreinemachers et al., 2016). Several review papers pointed to program elements beyond home garden training that appeared to contribute to the improved dietary diversity observed in home garden programs. Nutrition outcomes are more likely when agriculture interventions empower women by 1) improving their knowledge and skills or 2) promoting their increased control over income generated from garden produce (Ruel and Alderman, 2013). Several reviews also highlighted the importance of nutrition education activities (Iannotti et al., 2009; World Bank, 2007). Nutrition education is considered most effective when it encourages intra-household allocation of resources to include vulnerable household members such as mothers and young children (World Bank, 2007). Berti et al. (2004) concluded that home garden programs were often more successful than other types of agricultural interventions because they invested in many types of ‘capital’—physical, natural, financial, human and social—and therefore holistically addressed challenges households faced in attaining proper nutrition.

**Home gardens can be a valuable source of income to households, but gender dynamics within households determine if women also benefit from this income.**

Home garden programs have also been conducted as a method of raising income within smallholder households. Research into these programs is often more engaged in the pros and cons of linking smallholders with new urban and global markets than in quantifying the impact of farm-gate produce sales on household income (Weinberger and Lumpkin, 2007). The World Vegetable Center (formally known as the Asian Vegetable Research and Development Center) has found, however, that most smallholders will sell the excess produce from their home gardens (Keatinge et al., 2012). A growing body of literature around the gender dynamics of small-scale agricultural ventures shows that the economic benefits of horticultural production are often not equally distributed among all household members (Quisumbing and Pandolfelli, 2010; Van Den Bold et al., 2013). When men own the assets involved in agricultural activities, they are likely to capture the majority of the benefits. Women face significant barriers when beginning new agricultural initiatives because they start with fewer assets and less ability to engage in market
relationships (Quisumbing et al., 2015). Home garden programs are more likely to result in women’s empowerment, economic and otherwise, if gender dynamics are carefully considered.

Vegetable seed and vegetable seed systems have distinct characteristics that practitioners need to consider

Vegetable seed can be sourced from both local and global suppliers

- Private seed producers are typically focused on select high value crops, such as maize, and potentially lack diversity in their vegetable seed selection.
- Global seed suppliers can often supply varieties of ‘global vegetables’ that are suitable for numerous tropical conditions if local suppliers do not exist. (That said, there are numerous cases where purportedly global entries have been ill-adapted.)
- ‘Indigenous’ or ‘traditional’ (varieties that are consumed and sold locally rather than globally) vegetable seeds are often found with local suppliers. In general, indigenous vegetables contain much more micronutrients and phytochemicals (e.g. antioxidants) than global vegetables and are under-utilized sources of nutrition for rural populations (Yang, R. Y., and Keding, G. B. 2009.)
- Local seed suppliers are usually only accessible in areas with functioning markets. Seed quality is potentially low, and packages subject to adulteration with old or unclean seed. Projects need to carefully pre-test seeds purchased from local suppliers.
- No matter what the seed source, vegetable seed interventions must still take care to distribute crops and varieties that are suitable to local conditions.

Distributing diverse vegetable seed ‘baskets’ creates opportunities and challenges

- Anywhere from 5-10 varieties are often distributed simultaneously to increase beneficiaries’ access to a diverse range of food while also providing market opportunities. Practitioners therefore need to understand beneficiaries’ production, consumption and marketing preferences for several priority vegetable crops prior to distribution.
- Often only 5-10 grams of seed per variety is required to plant a ‘standard’ 6 x 6 m home garden. Low seed weights minimize distribution costs, however logistics may be complicated by the multiple number of crops and varieties being distributed.
- Seed companies often need to make special arrangements to package seed in small quantities, potentially complicating logistics and raising costs.
- Vegetable cropping seasons are not as distinct as seasons for staple crops. It is possible to distribute vegetable seed at multiple times during the year, but care has to be taken that the right variety is distributed during the right time of the year. Note that growing vegetables in non-rainy seasons, while possible, can lead to much more work (e.g. watering, managing grazing livestock, etc.).
Seed distribution is only the first step in achieving benefits from vegetable production

- In-depth training is often required for participants to successfully grow, harvest, preserve and cook vegetables. If beneficiaries are expected to save seed, then trainings on seed saving must also be conducted.
- Ideal planting times for vegetable crops may not be the same, even if vegetable seed is distributed as a package. Practitioners should have knowledge about the feasibility of growing vegetables at all times of the year, especially during off seasons.
- Beneficiaries might be unaware of the nutritional value of vegetables for their children and families and might require behavior change communication to stimulate their interest in planting and consuming vegetables.

Methods

Grey literature search

Grey literature consisted of project reports detailing emergency seed interventions and briefs on emergency seed projects accessed through Seedsystem.org, a major repository for seed-related information. The two main databases searched for project and program documentation were: Catholic Relief Services (CRS)’s Gateway and United States Agency for International Development’s (USAID) Development Experience Clearinghouse (DEC). Disaster relief project reports were also directly sourced from the World Vegetable Center. Reports were retrieved if projects took place in Africa, were short-term (under 12 months), unrolled in a disaster or chronic stress context, and used vegetable seed distribution as a component of the project. Program and project reports were initially summarized in a spreadsheet format capturing pertinent project details, such as the main project activities, vegetable seed distribution mechanisms, type of disaster addressed, project duration, and nutrition and income indicators reported.

In total, thirty-one separate projects were found from the DEC, Gateway, and the World Vegetable Center databases. Fourteen projects were found using the CRS Gateway database and another 14 found through the DEC. Three more projects were added from World Vegetable Center for a total of 31 projects.

In general, only scattered documentation was available within the databases searched. None of the 31 projects had a complete record available (proposal, quarterly reports, annual reports and/or project evaluation) to understand the project trajectory from conception to completion. In all cases, basic details were lacking from the available documentation to determine if proposed activities were completed and to what outcome. Project evaluations and ‘lessons learned’ documents were available for only six of the 31 projects. Cumulatively, however, the reports
provided insights into practitioners’ rationale for providing vegetable seed and showed something of the process as to how these projects are implemented.

Published literature search

A broad search of the peer-reviewed literature available on Google Scholar was also conducted in November 2016 to identify articles related to vegetable seed interventions or other interventions (such as home garden approaches) using vegetables to improve nutrition and income among smallholder farmers. A more specific search was also conducted within a set of specialized journals: International Journal of Disaster Risk Science, Development in Practice, Sustainable Agriculture, and Disasters.

Here again, in refereed journals, reporting was scattered. Although there is escalating research interest into home garden programs implemented to improve nutrition and income generation for smallholder farmers, no peer-reviewed articles were found that contained an analysis of emergency vegetable seed interventions.

Expert interviews

Twenty one emergency and development professionals were interviewed to understand (1) how vegetable seed interventions are currently addressing nutrition and income objectives and (2) how these interventions can be improved to further address nutrition and income needs. Twelve of those interviewed identified as development practitioners with experience in vegetable seed distribution programs, while nine are home garden or vegetable experts (Appendix 1). The interviewees represent eight different development and research organizations. Individuals within CRS, the World Vegetable Center, and Seed Programs International (SPI) were interviewed first, followed by professional contacts they recommended for further inquiry. Additional individuals were identified through a request sent out to a popular list serve utilized by development professionals. Individuals were interviewed if they had multiple years of experience distributing vegetable seed or conducting home garden programs.

The findings below are based on these combined data (21 interviews, 31 project reviews, etc.). We do not claim that they represent the full reality of the large universe of emergency vegetable seed interventions, but do hope that they offer select useful insights. This review is indeed a partial document. We put it in the public domain to stimulate reflection and further comment.
Findings

Use of Vegetable Seed during Crises Periods

Vegetable seed is currently used to respond to protracted crises and/or droughts

Project reports suggested that vegetable seed is more often supplied in areas of chronic insecurity and/or persistent droughts rather than acute crises (Table 1). Projects responding to human-induced disasters within the review were primarily the protracted crises occurring in the Central African Republic, Chad, Niger, Democratic Republic of Congo, Mali, South Sudan and Darfur. Drought-related projects occurred most frequently in Chad, Ethiopia, Niger and Madagascar.

<table>
<thead>
<tr>
<th>Acute</th>
<th>Protracted</th>
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<tr>
<td>Environmental disaster</td>
<td>Multi-season drought</td>
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<tr>
<td>Human-induced conflict</td>
<td>Protracted human-induced conflict</td>
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<tr>
<td></td>
<td>Protracted human-induced conflict merged with recovery efforts/medium-term development</td>
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<td></td>
<td>Protracted human-induced conflict combined with drought or flood conditions</td>
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Organizations often decide to supply vegetable seed because dietary diversity is low rather than because a seed system assessment showed a lack of access to vegetable seed following a crisis

Most programs operated on the rationale that high rates of malnutrition or low dietary diversity meant that beneficiaries had insufficient access to vegetable seeds. Very few conducted seed system analyses. Those that did relied on information collected from commercial seed suppliers, although agro-dealers have been shown to provide very little of the vegetable seed used by farmers (McGuire and Sperling, 2016). Vegetable seed systems in Africa are predominantly informal, even in non-emergency contexts. Vegetable seeds are often self-saved or purchased in local markets from non-certified vendors. Emergency practitioners often assumed that these informal seed systems were weak before the crisis and must be even weaker post-crisis.

Without further investigation, it is difficult to know how an emergency, either acute or protracted, will influence informal vegetable seed networks. It is possible that informal vegetable seed networks are actually more resilient to emergencies than staple crop seed systems since vegetable seeds are small, easy to transport from place to place, and many indigenous vegetable species, like amaranth, are hardy and easy to multiply quickly.
The process of actual vegetable seed distribution was considered less logistically challenging than that of staple crop seed distributions

Practitioners listed several characteristics of vegetable seed that make it cheaper and less logistically challenging for emergency programs to deliver vegetable seeds than staple crop seeds.

- Vegetable seed is lightweight, so large quantities of seed can be flown in a plane or transported in a small truck. This means vegetable seed can be delivered to places where bulkier staple crop seed cannot.
- Very little seed is required to grow a home garden, making it less expensive to supply vegetable seed to a household than staple crop seed.
- Vegetable seed is rarely eaten by beneficiaries, reducing risk of seed being used for unintended purposes.

Practitioners mentioned minor challenges in preserving vegetable seed quality when initially working with vegetable seed. These problems were typically resolved quickly when organizations learned the best way to store and deliver vegetable seeds sensitive to high relative humidity.

Most project reports provided very few details into the seed selection process used by organizations

Seed sourcing: Most reports did not mention how seed for the project was sourced (although this information is usually provided prior to a grant award). The few reports that did include this information noted that seed for seed fairs would come from local suppliers, and directly distributed seed would come from regional seed companies and/or from sources linked to the UN Food and Agricultural Organization (FAO) (that itself may procure from large international companies).

Seed types: Most reports listed the species of vegetables to be provided without details as to how each species, or the seed basket, was selected. A few reports mentioned that “market” vegetables would be provided while some referenced quick-growing vegetables that could replenish food supplies rapidly. Tomato, onion, okra, and amaranth were the most commonly supplied vegetable seeds in the projects reviewed (Figure 1). No report provided substantial information into the methods used by organizations to identify the appropriate vegetables to supply to their specific project area.

Number of crops supplied: There was no consistent number of crops supplied by organizations. Projects supplied anywhere from one to eleven different vegetable crops to beneficiaries.

A CRS project in CAR was able to surreptitiously deliver vegetable seed to a besieged Muslim community when WFP food aid trucks delivering maize seed aid were routinely hijacked and looted by extremists.
**Seed distribution mechanism:** Project reports consistently listed if they would distribute seed through either direct distribution or a seed fair/voucher intervention. Direct distributions were slightly more common than seed and voucher fairs, but both methods were used. Twelve projects mentioned using direct distribution while seven used a seed fair.

Despite being easy to distribute, organizations faced multiple challenges in supplying the ‘right’ vegetable seed

Organizations recounted many instances of finding it challenging to select vegetable crops and varieties that they felt were appropriate for their beneficiaries (Table 2). It was common for organizations to find at the end of their program that beneficiaries did not understand how to grow or consume particular crops provided in their seed basket.

In some cases, vegetable programming was new to an organization and groups struggled to gather accurate information on the appropriate vegetable crops and varieties for their region. Sometimes organizations struggled to implement their nutritional goals by selecting desirable vegetable seed choices. It is a challenge to introduce new vegetables, even if they are nutritious, to a population that is not accustomed to a diverse diet. New vegetables or varieties that were not properly introduced to beneficiaries often remained unused. Additionally, many NGOs are still learning how to merge their agricultural and nutrition teams to supply a nutritious seed basket. Programs suffered if the two teams did not share expectations of working towards a common goal. Sometimes the choice of vegetables was beyond the control of organizations. Organizations that relied on seed in-kind donations from the FAO (who may source from multinationals) often felt that their nutrition objectives could not be met by the seed options offered.
Table 2. Challenges Faced in Developing a Seed Basket

<table>
<thead>
<tr>
<th>Lack of understanding of variety appropriate for context</th>
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<tbody>
<tr>
<td>FAO promoted red leaf amaranth in the Central African Republic since amaranth is a popular vegetable, but the red leaves turned cooking water red and was linked to sorcery and quickly discarded by beneficiaries.</td>
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<tr>
<th>Misunderstanding of nuanced vegetable consumption patterns</th>
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<tr>
<td>A project in the Central African Republic misinterpreted their pre-assessment focus group data to mean that populations consumed all the vegetable species they listed, when, in actuality, some of the species listed were market crops only consumed by select wealthy consumers in urban areas. Beneficiaries themselves had never consumed those crops and subsequently had difficulty incorporating them into their diet.</td>
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<tr>
<th>Vegetable species included for nutritional value without proper introduction to beneficiaries</th>
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<tr>
<td>A project introduced carrot to a South Sudanese population to improve nutrition, but failed to properly teach beneficiaries cultivation and cooking methods. The beneficiaries believed they were receiving hot chili seed and thus planted the seed inefficiently and were confused at the emerging plant and how they were supposed to use it.</td>
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Nutrition and Income Goals of Vegetable Seed Interventions

Nutrition goals are often more explicit in vegetable seed interventions than income goals, however, farmers often aim for both gains.

Because low dietary diversity is often the basis for providing vegetable seed, vegetable seed projects often have nutrition objectives, however these objectives are not often formalized. Income generated from informal commercial activities, i.e. selling surplus vegetables at the farm gate, was considered a byproduct of seed distribution and was never considered important enough to be an objective of the project. In contrast, in many of the nutrition projects reviewed, farmers also reported selling some of the vegetables for income.

A good number of practitioners considered vegetables to be more effective at improving household access to food during a crisis than providing households with access to cash. Vegetable seeds were viewed as a quick way to increase beneficiaries’ access to diverse foods. Practitioners recognized that additional income from vegetable sales is highly motivating to beneficiaries, but commonly felt that income objectives should not be developed if the project is not linking beneficiaries to established markets. Practitioners felt that market programs are unrealistic under an emergency project context given the high likelihood of disrupted markets
insecure transport conditions, and the long time-frame and investment required to create new markets and orient farmers towards market production (3).

“Nutrition goals are much more implicit than explicit oftentimes, even though, obviously, if it is a food security project, there is nutrition information that is going into the decision.”

Catholic Relief Services, Central African Republic

Vegetable seed interventions are always done in conjunction with other project activities, but it was not always clear how these activities formed a consistent approach to improve income or nutrition.

On average, projects conducted 3-4 activities in addition to vegetable seed distribution or a seed fair. Many of these activities intended to improve either income or nutrition among beneficiaries, however these activities were not noticeably linked to seed distributions. Projects frequently used Village Savings and Loans Associations (VSLAs) or microfinance, Cash for Work (CFW), vocational training, and Unconditional Cash Transfers (UCTs) as income generating activities, but did not mention how these activities might be impacted by vegetable sales. Nutrition programming included nutrition education and Water and Sanitation Hygiene (WASH). Although practitioners discussed nutrition education as an activity frequently paired with seed distribution and seed fair events, practitioners and project reports were never explicit about how vegetable seed distribution complemented an overall nutrition strategy.

Nutrition objectives unevenly addressed by most organizations

Organizations often sought to improve the nutritional status of beneficiaries by supplying seeds for nutritious vegetables, improving garden yields through agricultural trainings, and educating beneficiaries in how to cook garden produce, however some organizations were more thoughtful at encouraging nutritional outcomes than others.

“Seed distribution alone has not been very effective.”

Bioversity International, Nepal

Organizations with a thoughtful approach to nutrition purposefully selected vegetables for their nutritional value and taught beneficiaries not only how to plant and take care of vegetable gardens, but also how to increase the nutritional payback of their efforts in the garden. Some organizations recognized that certain agronomic practices could be used to improve consumption of vegetables (see Best Practices). Most organizations, however, followed a standard training that showed beneficiaries basic garden maintenance without emphasizing nutritional goals (Box
1). These organizations were operating on the assumption that the seeds provided would improve nutrition if beneficiaries simply planted the seeds and ate from their garden.

Recognition of the benefits of providing nutrition education and cooking demonstrations was growing among practitioners. Two practitioners mentioned very good success using simple nutrition messages that were consistently repeated through media campaigns and dialogue with beneficiaries (5, 15). Beneficiaries were able to recall these messages at the end of the program. A few practitioners had experience using cooking demonstrations to introduce new crops to beneficiaries. These practitioners stated that the cooking demonstrations were essential to program success (10, 16). Note that nutrition education (perhaps leading to real behavior change) often requires longer term efforts and may be difficult to achieve in a 6-12-month program.

**Box 1. Basic agricultural training often accompanied seed distribution**

In cases where vegetable gardens were introduced to beneficiaries without a history of vegetable production, such as pastoralists or refugees residing in camps long enough to lose their agricultural knowledge, basic agronomic training was used to introduce the important elements of vegetable production. However, even when seed was distributed to populations familiar with home garden vegetable production, basic agronomic training was used to introduce improved practices. Some projects offered a “quick refresher” course to farmers so that they could re-establish their gardens quickly. Other projects had more involved trainings that covered important topics from planting to harvesting to seed saving and storage. Trainings were given to improve traditionally low yields, introduce new species and varieties, and assist farmers in adopting new techniques, such as dry season farming (11). Agricultural trainings were often followed up with a series of home visits. Field assistants doing routine monitoring work were most often charged with conducting these follow up trainings at the household level.

**Projects are not in the habit of providing evidence of advancement in nutrition or income goals**

Although reports on vegetable seed distributions cited a desire to improve nutrition and/or income among beneficiaries, no evidence was provided that organizations made either short or long-term advancements in these areas. This information is not required by all donors and is therefore not included in project reports.

Practitioners were familiar with a number of key nutrition and food security indicators, such as dietary diversity, Household Hunger Score (HHS), and Household Food Insecurity Access Scale (HFAIS), however these indicators were used primarily for beneficiary selection rather than project impact evaluation. Practitioners from nutritionally-oriented organizations reported that their organizations consistently measured a host of key nutrition indicators for internal purposes, but did not include these results in donor reports unless required.
It is unknown if vegetable seed interventions are having a significant impact on beneficiaries’ nutritional status or ability to generate new income because the relevant indicators are not included in most vegetable seed intervention reports.

**Best Practices for Indicator Selection**

We still do not know if and how vegetable seed interventions impact beneficiaries’ diets (nutritional status) and income in either the short or long term. Collecting basic information on beneficiaries’ gardens, their diet, and their income can help answer this question. Robust data will also help practitioners find weaknesses in their project design and strengthen future projects, particularly if seed projects are repeated in the same area for multiple seasons. Data on project outcomes will also help communicate the strengths of a particular project’s approach to donors. In the long term, cumulative information on vegetable seed interventions will help the seed system community understand what sort of impact can be expected from this approach, what conditions are most likely to lead to these changes, and what best practices should be deployed to maximize impact.

**Data should capture four main factors that determine the success of vegetable seed deliveries**

Practitioners typically capture basic output indicators, such as the number of beneficiaries who planted the seed, the value of the seed distributed, and number of hectares planted with distributed seeds. While useful, this information does not determine if the project was effective at fulfilling beneficiaries’ vegetable seed needs.

Practitioners need to know if their project successfully provided:

- Sufficient *quantity* of seeds
- Seeds of high *quality*
- Vegetable crops *appropriate* for either consumption or marketing purposes
- Seed *varieties* appropriate for either consumption or marketing purposes

This information can be collected through a simple survey asking beneficiaries yes/no questions for each vegetable crop individually (Table 3). If data analysis reveals a problem with some aspect of seed distribution, or perhaps conflicting responses (half of beneficiaries responded ‘yes’ while half responded ‘no’), then focus group discussions can be held to gain further insight into why these opinions exist and what can be improved in future projects.
Table 3. Sample Data Collection Sheet for Seed Indicators

<table>
<thead>
<tr>
<th>Were you satisfied with the quality of the seeds provided? Y/N</th>
<th>Were you satisfied with the quantity of the seeds provided? Y/N</th>
<th>Were the seeds provided appropriate for your home consumption? (if applicable) Y/N</th>
<th>Were the variety of this seed provided appropriate for your home consumption? (if applicable) Y/N</th>
<th>Was the variety of this seed provided appropriate for your marketing needs? (if applicable) Y/N</th>
<th>Did the timing of seed distribution allow you to plant on time? (ask question for each distribution event) Y/N</th>
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<tbody>
<tr>
<td>Onion</td>
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<tr>
<td>Carrot</td>
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<tr>
<td>Tomato</td>
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<tr>
<td>Amaranth</td>
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“If you evaluate your seed kit distribution after the first distribution, you can always adjust it for the second distribution”

World Vegetable Center, Tanzania

**Agricultural data collection should contain garden-appropriate indicators that measure changes in beneficiaries’ access to vegetables at all times of year**

Projects can also incorporate garden-appropriate agricultural indicators that measure changes in agricultural production. Garden activities differ from field crop activities in a number of important ways (Table 4). Farmers may aim for ‘intensive’ versus ‘extensive’ production through the use of bio-intensive planting techniques, multiple crops may be grown in the same plot, and harvesting is successional rather than all at once. All of these practices can ultimately lead to more productive vegetable gardens and should be encouraged; using garden-appropriate indicators rather than using standard field crop indicators will allow these changes in agricultural practices to be highlighted appropriately.

Table 4: Field Crop Indicators Not Applicable to Home Gardens

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Problem</th>
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| Increase in amount of land farmed | • Vegetable gardens not always square or easily measurable, e.g. keyhole gardens, hanging gardens, container gardens  
• Does not capture increased use of ‘intensive’ planting methods  
• Does not easily capture scattered vegetable plantings around house and farm  
• Intercropping of vegetable crops in one plot is common |
Yield increases (kg of produce harvested)

- Vegetable crops do not have uniform yield measurements.
- Nutritious vegetables (dark leafy greens) often weigh less than water-dense, less nutritious vegetables (cabbages).

A primary goal of vegetable projects is often to increase beneficiaries’ year-round access to a diverse range of nutrient-dense foods. Agricultural indicators should measure progress towards this goal (Table 5).

<table>
<thead>
<tr>
<th>Table 5. Garden-Appropriate Agricultural Indicators</th>
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<tbody>
<tr>
<td><strong>Indicator</strong></td>
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<tr>
<td>Number of crops beneficiaries have grown in the past season compared to baseline</td>
</tr>
<tr>
<td>Number of weeks or months beneficiaries harvest each vegetable crop compared to baseline</td>
</tr>
<tr>
<td>Months per year without vegetable harvest or consumption</td>
</tr>
<tr>
<td>Yields for individual garden crops</td>
</tr>
<tr>
<td>Adoption of improved practices</td>
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</table>
Dietary changes are a key element of vegetable seed interventions and need to be measured as part of a larger nutrition strategy

Nutrition is a complex issue and—although diet is a major contributing factor—nutritional status is influenced by a range of factors. Some nutritional outcomes, like decreases in stunting or wasting, are unlikely to change through increased vegetable consumption alone. Changes in vegetable consumption are often the primary objective of vegetable seed interventions however, so they should be measured and reported. Using a mix of the below tools will ultimately give the best picture of how the project influenced vegetable consumption.

**Validated Food Security Scales**

Although a number of food access scales are frequently used by projects for participant registration and project monitoring, they are not well suited to record changes in diet due to vegetable seed interventions. For instance, the HHS, HFIAS, Food Consumption Score (FCS), and the Coping Strategies Index (CSI) do not ask about vegetable consumption specifically and are not sensitive enough to capture small, and potentially short-term, increases in vegetable consumption.

**Dietary Diversity Scale**

The Dietary Diversity Scale (DDS) can be used to monitor new vegetable consumption and is the most appropriate indicator for a garden project. Dietary diversity is a commonly used proxy for nutrient adequacy of the diet of individuals. The DDS can be tailored to collect information on the diet of the most vulnerable household members, typically women of reproductive age and children, rather than household-wide data. Household-wide data obscures household disparities in food allocation and should not be used to

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If beneficiaries already consume some vegetables in their diet, then adding new—even potentially more nutritious vegetables—will not impact the DD score because the DDS records food *groups* rather than individual food items. For example, in communities where onions, which have limited nutritional value, are widely consumed, the DD score would indicate that vegetables are consumed. A project that increases consumption of nutrient-dense leafy vegetables would increase the amount of nutrients individuals consume, but this will not captured by the DDS. Similarly, if households already consumed a small amount of foraged leafy vegetables, the DDS will not capture if a household is now able to eat leafy vegetables daily from their cultivated garden. Therefore, although the DDS records vegetable-specific information, it still will not show increases in the quantity or frequency of vegetable consumption.
capture nutritional outcomes. In addition, the DDS can be designed to capture consumption of specific foods that are of interest to the project, such as vitamin A rich foods or indigenous vegetables. The DDS, however, has its limitations (Box 2).

**Capturing changes in vegetable consumption**
Because the DDS can answer some, but not all, questions about changes in vegetable consumption and overall dietary quality, practitioners are encouraged to collect a suite of information to demonstrate how diets have changed over the project life span (Table 6). At the end of a project, practitioners should be able to answer how the vegetables being promoted by the project are contributing to and altering beneficiaries’ diets. Table 7 contains sample questions to determine the dietary effects of vegetable seed interventions.

<table>
<thead>
<tr>
<th>Table 6. Dietary Quality Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator</td>
</tr>
<tr>
<td>Change in frequency of consumption of vegetables (by crop) for HH or vulnerable members of HH (7 day recall)</td>
</tr>
<tr>
<td>Change in number of meals incorporating vegetables for adults and/or children in the household (7 day recall)</td>
</tr>
<tr>
<td>Change in source of vegetables (by crop) consumed within the household relative to baseline</td>
</tr>
<tr>
<td>Proportion of own produce (by crop) consumed within the household</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 7: Sample Questions for Dietary Quality Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicators</td>
</tr>
<tr>
<td>Change in frequency of consumption of vegetables (by crop) for HH or vulnerable members of HH (7 day recall)</td>
</tr>
<tr>
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</tr>
<tr>
<td>Change in source of vegetables (by crop) consumed within the household relative to baseline</td>
</tr>
</tbody>
</table>
Proportion of own produce (by crop) consumed within the household

How much of the tomatoes grown in your garden were consumed within the household? Answer choices: 1. Very much 2. Quite a bit 3. Some 4. Very little 5. None

70% of households answered that they consume the majority (Very much and Quite a bit) of the tomatoes they produced in their home gardens, but pumpkins were less frequently used for home consumption. The majority of households (85%) responded that they consumed very little of the pumpkins they produce. Focus group discussions reveal that pumpkins are frequently used to barter for other food items (onions and potatoes).

Measuring the income generated from garden sales is an important part of assessing overall project impact

Projects are not in the habit of recording the small income generated from vegetable sales, but this information can help projects understand how specific vegetables are used by households or if women are empowered economically by vegetable production (Table 8). This information will help determine how certain income benefits can be maximized (women keep income from produce sales) or challenges can be addressed (nutritious foods are being sold to purchase nutritionally deficient foods). Vegetable sales can contribute both positively and negatively to a household’s wellbeing and an understanding of marketing behaviors will help maximize or minimize these effects. Table 9 contains sample questions to determine the income effects of vegetable seed interventions.

“It would be interesting to know why people are selling. Is it because they have enough and they can sell or is it because there is something they prefer and they want to get rather than vegetables?”

Samaritan’s Purse, Democratic Republic of Congo
### Table 8. Income Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Objective</th>
</tr>
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<tbody>
<tr>
<td>Percentage of households selling vegetables</td>
<td>Understand how widespread marketing activities were in project</td>
</tr>
<tr>
<td>Types of vegetables sold by households</td>
<td>Understand how each vegetable crop most likely benefited beneficiaries</td>
</tr>
<tr>
<td>Recipient of income from vegetable sales (by crop)</td>
<td>Understand who in family most likely to gain economically from vegetable sales</td>
</tr>
<tr>
<td>Change in proportion of vegetable harvest (by crop) sold relative to baseline</td>
<td>Indicates if household garden strategy changes as a result of project</td>
</tr>
<tr>
<td>Primary market for vegetable sales (by crop)</td>
<td>Understand if beneficiaries are engaging in formal or informal vegetable markets</td>
</tr>
<tr>
<td>Change in priority income sources of the household relative to baseline</td>
<td>Indicates if vegetable gardens have become a significant source of income for households due to the project</td>
</tr>
<tr>
<td>Money generated by vegetable sales (by crop)</td>
<td>Understand the degree of impact a vegetable able to have on a household’s economic status. This indicator takes time to collect and can be done for one specific vegetable of interest if desired.</td>
</tr>
</tbody>
</table>

### Table 9. Sample Questions for Income Indicators

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Example Survey Question</th>
<th>Example Summary Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of households selling vegetables</td>
<td>Did you sell any of the vegetables grown in your home garden?</td>
<td>70% of households reported selling some of the vegetables produced in their home gardens</td>
</tr>
<tr>
<td>Types of vegetables sold by households</td>
<td>Did you sell any of the tomatoes grown in your home garden?</td>
<td>80% of households sold tomatoes while only 10% reported selling amaranth</td>
</tr>
<tr>
<td>Recipient of income from vegetable sales (by crop)</td>
<td>Who is the primary recipient of the income generated from cabbage sales? Answer choices: 1. Men 2. Women 3. Men and women together 4. Whole household</td>
<td>Women were the primary recipients of income generated from cabbage sales, but men and women tended to share income from onion sales.</td>
</tr>
<tr>
<td>Change in proportion of vegetable harvest (by crop) sold relative to baseline</td>
<td>How much of the onions grown in your garden were sold? Answer choices: 1. Very much 2. Quite a bit 3. Some 4. Very little 5. None</td>
<td>Prior to the project, only 10% of households reported selling the majority of their onion crop (Very much and Quite a bit), but after the project 50% of households reported selling the majority of their onion crop.</td>
</tr>
</tbody>
</table>
Primary market for vegetable sales (by crop) | In what type of market did you primarily sell your onion crop? Answer choices: 1. Farm gate 2. Walking around village 3. Local market 4. Regional market | Households sold their onions primarily through on-farm sales (90%), but 10% of households sold their onions at a local market.

Change in priority income sources of the household relative to baseline | Please list the three most important income sources for your family in order of importance. | Vegetable sales were listed as a primary source of income by 50% of households after the project, but no households mentioned vegetable sales prior to the project.

Money generated by vegetable sales (by crop) | How many cabbage heads did you sell this season? What is an average price you received per cabbage head? | On average, households generated 10,000 RwF (13 USD) from cabbage sales in the past season.

**Additional Data Collection Considerations**

- Developing data collection activities, including deciding what indicators to collect, should be done at the same time as a project is being designed. The process of determining how impact is measured can help clarify the project goals and theory of change. If it is decided that data should not be collected on a particular activity, it is a good time to sit back and ask— if the activity is not worth measuring, is it worth doing?
- Seasonal fluxes in agricultural activities and food availability can significantly influence the outcome of agricultural, nutrition, and income surveys. If baseline and endline surveys are not conducted during the same time of year then the results will be misleading. Dietary information should be collected during the lean season to understand beneficiaries’ access to food during the period when hunger is most abundant.
- Women will often have a better idea of what food was prepared for the household or what foods children consume. If women are in charge of the gardens, they will also have a better idea of the work that went into the garden and garden yields. It is best to ask these questions to women directly. If local tradition dictates that the survey be directed to the head of the household, strongly suggest that women remain close by to answer specific questions.
- Survey questions on vegetables are almost always asked about vegetables collectively, rather than each vegetable species individually. Grouping vegetables can lead to important lessons learned being lost.
- Survey time can be decreased by targeting specific questions to specific vegetables, rather than asking every question for every vegetable seed provided.
• Answer choices should be as complete as possible to avoid confusion for data collectors in the field. Answer choices can always be combined during data analysis. For example, if beneficiaries receive vegetables from their neighbors as well as from visiting family members, these can be two different answer choices on a survey form, but can later be combined during analysis and reporting to ‘vegetables received as a gift.’

**Best Practices for Delivering a Vegetable Seed Intervention**

These recommendations were compiled after an assessment of the available literature and interviews with twenty-one practitioners engaged in emergency and development vegetable projects. Practitioners were asked about the strategies they believe to be most effective when distributing vegetable seed. This thinking was combined with the results of academic research on home garden interventions operating during non-crisis situations. These recommendations represent our best knowledge of how practitioners can use vegetable seed in a targeted manner to address nutrition and income needs during a crisis.

**Ensure that the situation on the ground is appropriate for a vegetable intervention**

Disasters can be simple or complex, one off or repeated, slow or rapid onset, but vegetable interventions nevertheless require certain variables to be in place for farmers to successfully grow and harvest a crop. Vegetable interventions will always require farmers to have access to a place to grow vegetable crops and at least basic agricultural inputs. It is important to think about the environment in which an intervention will take place prior to designing a program. Thinking about the factors listed in Box 3 before designing a project will help determine if a vegetable intervention is feasible and, if not, what additional steps need to be taken to create the proper conditions for vegetable production.
Box 3. Can the project area support a vegetable seed intervention?

Land requirements

- Do farmers have access to secure land?
  - Will farmers encounter any danger while working in their plots?
  - Can they safely travel to and from this land?
- Are farmers able to access this land until a vegetable harvest is expected?
- What size plot is available to farmers?
  - Vegetable gardens do not have to be very big, however it is important to consider plot size—and the harvest expected from this plot size—when setting expectations for project impact.
- Will it cost farmers money to use this land and will this make land less accessible to some individuals?
- What is land quality? Consider soil fertility, shade restrictions, degree of incline, rockiness, flooding potential, and access to water during dry seasons.
- If a bag garden is envisioned, do farmers have access to soil to fill the bags?

Agricultural inputs

- Do farmers have access to the additional inputs they need besides seed to grow vegetables?
  - Soil amendments such as compost or mineral fertilizer
  - Pest and disease control
  - Agricultural tools
  - Mulch and materials for nursery shade
- Are water sources available for inter and intra-season droughts?
  - Do farmers have knowledge in how to use water sources?
  - Do farmers have equipment needed to use water sources

Enabling environment

- Is the situation stable enough that farmers can be expected to successfully cultivate, harvest, and sell or consume a crop?
  - Is it likely that farmers will be displaced before the end of the season?
- What has been the impact on human capital as a result of the conflict?
  - Has there been a large loss of agricultural knowledge due to death, displacement, or migration?
  - Has there been a change in labor availability? Are women especially impacted by these changes?
  - If farmers are new to the area, how will this impact their ability to successfully farm?
- Were markets disrupted?
  - Have regional markets closed or are they inaccessible due to conflict or poor conditions? How does this change supply and demand for vegetable products?

Source: modified from Sperling, 2008.
Conduct a vegetable seed system assessment before deciding to supply seed

Practitioners should conduct a survey to ask about vegetable seed availability and verify this information with a household or community transect walk prior to distributing vegetable seed. These two activities will provide valuable information on beneficiaries’ current seed needs to guide project design.

It is important to confirm that beneficiaries are indeed unable to access high quality vegetable seed through other channels rather than simply observing low dietary diversity or high malnutrition. Farmers often source a majority of their seeds through informal channels (McGuire and Sperling, 2016). Distributing vegetable seed could disrupt these informal markets and result in ineffective aid. Conducting a seed system assessment will help determine if vegetable seed access is poor and what are the specific barriers to seed access (see Checklist below).

A transect walk allows the field team to observe all the vegetables currently available to beneficiaries, including the ones not mentioned during the formal survey. Beneficiaries might intentionally or unintentionally leave out certain vegetables, either in hopes of receiving seeds from projects or because beneficiaries themselves do not consider certain vegetables worth mentioning. This is likely to occur with many indigenous vegetables that beneficiaries do not consider valuable, but practitioners would find important for their nutritional content. A transect walk must be completed by someone skilled at identifying plants that are often consumed in the area, including plants that are foraged or grown with little input from the beneficiary. While walking around the compound, ask beneficiaries if there are any plants around that are good to consume, if they have anything growing in a current garden, and how they source seeds or planting materials for these plants. This exercise allows the project to understand the full breadth of vegetable products available to beneficiaries and how they access these products.

Checklist for Assessing Vegetable Seed Security and Beneficiaries’ Vegetable Needs

Step 1: Assess vegetable seed security

Similar to food insecurity, a seed system is secure when producers have access to good quality seeds at all times that it is needed. Thinking through the various aspects of a secure seed system – seed availability, producers’ ability to access seed, and seed quality – can help practitioners design their programs to target the specific gaps leading to seed insecurity (Sperling, 2008). The Seed Security Assessment manual published by the International Center for Tropical Agriculture (CIAT), CRS, and USAID details how these problems look in a seed system. A proper vegetable seed system assessment first determines if there are gaps in producers’ ability to access quality vegetable seeds and then details the root cause of these gaps. It is important to remember that problems might not be uniform across vegetable types. Producers may be able to access amaranth seeds with negligible effort, but tomato seeds could be poor quality and unaffordable to vulnerable households. For this reason, it is important to assess seed system gaps for each type of seed individually.
<table>
<thead>
<tr>
<th>VEG TYPE</th>
<th>SEED AVAILABILITY AND ACCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred Vegetable Seed Types</td>
<td>Seeds available when needed? (Y/N)</td>
</tr>
</tbody>
</table>

Onion
Carrot
Tomato
Amaranth

* For every No written, make a note as to why beneficiaries’ answer was No

**Step 2:** *If seed availability is diagnosed as a problem*, identify appropriate vegetable seeds for distribution and potential nutrition and income impacts of distributing that species.

Unlike staple crop distribution, it is often unclear at the outset what types of vegetables are most appropriate for distribution. Vegetable seeds are often distributed as a ‘basket’ and each vegetable species may offer something different to a household. In addition, vegetable preferences, intended uses, and cultivation styles differ over a much smaller geographic region than staple crops.

For each vegetable species, it is necessary to understand the inputs and skills required to grow it within the project region and if beneficiaries possess these capabilities (see Marks et al. n.d. Practice Brief 12). Practitioners should also understand what benefits a household might derive from growing certain vegetables and if there are any unintended negative consequences. The benefits of growing a vegetable crop may not be equally distributed within the household, e.g. children may not eat the vegetables or the burden of vegetable production might fall predominantly on the women in a household. Beyond vegetable types, practitioners have to be cognizant of variety selection. Varieties must both grow well in the project environment and have the cooking and marketing characteristics desired by beneficiaries.
From the beginning, plan for a project in farmers want to attain nutrition and income goals and this includes measuring the impact of small-scale vegetable selling

In most ‘nutrition projects’ reviewed, farmers also sold a portion of the vegetables produced. This means that both income and nutrition goals have to be anticipated from the beginning of project concept and design. Informal methods of gaining income from vegetables should be considered along with nutrition goals. If beneficiaries’ market behaviors are well understood, then sales of vegetable products do not necessarily detract from household consumption of vegetables and can lead to many positive outcomes, such as women’s empowerment.

Many practitioners did not consider the small-scale selling of produce to be worth promoting or measuring, but it is highly likely that beneficiaries will sell a certain portion of their garden produce when it comes to harvest time. Even if income benefits are not the primary outcome of the project, it is important to recognize this important source of quick, supplementary income and plan for surplus produce to be sold. As women are frequently targeted in these programs, income earned from this activity will most likely contribute to women’s empowerment while also benefiting the household. Emergency programs can use the same tactics as development programs and use income generation messages to “boost the morale” of participants, while also providing nutrition training to encourage home consumption and the purchase of other nutritious
foods from vegetable sales (3). Sales of excess vegetable produce may actually encourage adoption of vegetable production, improving access to vegetables over the long term.

“In a small garden there will be some surplus that the family can’t consume immediately”

*Catholic Relief Services, Haiti*

**Incorporate vegetable seed deliveries into a broader nutritional strategy**

Nutrition is a complex issue and—even though diet is a major contributing factor—nutritional status is influenced by a range of factors. Some nutritional outcomes, like decreases in stunting or wasting, take multiple years to show significant change and are unlikely to change in the twelve month time span allotted to emergency projects. They are also unlikely to change if vegetable consumption is temporarily increased, but other factors remain constant.

Vegetable projects should be designed to complement other activities addressing malnutrition during emergencies. Emergency vegetable projects are best at improving dietary diversity in the short-term and can help set the stage for dietary improvements in the long term if well executed.

**Strategically select a seed basket**

**Seed baskets should maximize nutritional value and income potential through careful seed selection**

- Seed baskets should contain a nutritionally diverse set of vegetables, such as dark leafy greens, Vitamin A rich vegetables, and a legume.
  - Beneficiaries can be given options within nutritional categories to encourage autonomy while ensuring a nutritionally complete seed basket, i.e. beneficiaries select one of three dark leafy green options provided.
- The seeds selected should produce food for as much of the year as possible. Quick maturing vegetables are often promoted because of the short time between planting and harvesting, but a mix of crops with short and long maturation periods will ultimately provide beneficiaries with nutritious foods for longer. Consider including a perennial if beneficiaries are geographically stable.
- Providing between five and seven species in a seed basket allows for crop diversity while not overwhelming staff and beneficiaries.
• Understand which vegetables are already incorporated into beneficiaries’ diets and which ones will need additional programming to be introduced (see Box 4).
• Variety selection should be done carefully to select varieties that are culturally and climactically appropriate.
• Understand prior to distribution which vegetables have market value and will most likely be sold rather than consumed.
• Think about how beneficiaries will access similar seed after the program is over. Are seeds available locally at an affordable price? Can beneficiaries save the seed from the project or is a hybrid variety being promoted?

It takes time for beneficiaries and practitioners to come to an appropriate seed basket

It is difficult to understand beneficiary needs initially since beneficiaries themselves need time with the seeds to make a proper assessment. It often takes farmers at least two seasons of trial and error before they are comfortable with new varieties and new techniques. Providing a seed basket with 6-7 different varieties allows for a few ‘flops’ while still contributing to dietary diversity goals. Areas with repeated seed programs should expect to adjust the seed basket they provide with every distribution. Proper evaluation of each seed type distributed will help with this recalibration.
Box 4. Is it appropriate to distribute new crops or varieties during a crisis?

Practitioners often introduce a new vegetable during a seed project in order to add diversity to beneficiaries’ diets. But new vegetables sometimes show up during project monitoring as unplanted, unharvested, or uneaten because beneficiaries did not know how to incorporate them into their practices. So when is it appropriate to introduce a new vegetable into an emergency program?

It is generally considered ineffective to introduce something new to beneficiaries during a period of extreme stress when people are unlikely to learn a new skill or adopt a new diet. Seed delivery during acute emergencies should “replace what was lost” and minimize any behavior change required by the beneficiaries (12). During acute emergencies, it is especially important to identify vegetables that can quickly fill food gaps and do not require additional inputs or trainings. Although sometimes an acute emergency can make a new livelihood like vegetable growing more appealing, beneficiaries’ willingness to adopt a new behavior needs to be carefully assessed. Project designers should be cautious about beneficiaries’ ability to absorb new information during a time of turbulence.

However, it might be possible, and even desirable, to introduce a new nutritious vegetable to beneficiaries who are not overwhelmed by the crisis during the project time frame. Beneficiaries located in areas experiencing chronic insecurity will often live with the conflict for the foreseeable future; new skills could help them weather the storm. Likewise, changing climate conditions that exacerbate food insecurity could create conditions where new food options are welcome. When introducing a new vegetable, practitioners need to select crops with a good opportunity for success and incorporate behavior change activities that facilitate their adoption. Beneficiaries will need support as they learn to grow and eat new crops or new varieties. If the crop is meant for home consumption, cooking demonstrations with simple nutrition messages embedded are a powerful way to motivate households to consume a new vegetable. Local chefs can be asked to create culturally-appropriate recipes incorporating new vegetables (10). Finishing an agronomic training in time to prepare a lunch featuring new vegetables is an excellent way to reinforce the lessons of the day and the importance of nutritious eating. It is not advisable to introduce more than one, at most two, new vegetables at a time to minimize stress on beneficiaries and not overwhelm staff capacities.
Design trainings to boost nutrition and income returns from garden plots

Promote agronomic techniques that improve beneficiaries’ ability to consume and sell from their gardens

- Staggered plantings lead to staggered harvests and avoid a glut of produce at harvest
- Improved harvesting techniques increases yields, which is good for consumption and marketing purposes
- Post-harvest handling techniques can help beneficiaries preserve food from their gardens
- Trainings on seed saving techniques can extend the benefits of a seed distribution indefinitely

“It is really good to give a training component alongside giving people seeds so they can extract value from the seeds they receive.”

Samaritan’s Purse, Democratic Republic of Congo

Trainings should be given to those physically responsible for the garden

Women are often responsible for home garden production and therefore should receive the training and any associated training materials directly. Information given to men to bring back to women is at risk of not being properly or fully communicated.

Follow up visits are as essential as the initial trainings themselves

Home visits encourage beneficiaries to plant the seed and offer an opportunity to troubleshoot individual problems that may arise. Follow up visits are most important when gardens are being established to encourage beneficiaries to plant seeds and help beneficiaries overcome initial hurdles. Further support at key times during the season can prevent small problems from becoming insurmountable barriers to adoption.

Incorporate nutrition education and cooking demonstrations into agronomic trainings

Nutrition education is necessary to translate food production into improved dietary intakes, particularly for vulnerable household members. It is unrealistic to expect major behavior changes to occur during the short time frame of an emergency program, but simple nutrition messages and cooking demonstrations will help beneficiaries make informed decisions about how to use their garden produce.

“It is really good to give a training component alongside giving people seeds so they can extract value from the seeds they receive.”

Samaritan’s Purse, Democratic Republic of Congo

“Taste is everything when it comes to vegetables... if you cook it together with them, and they taste it and like it, that’s it. They will move on with it”

World Vegetable Center, Mali
Trainings should teach beneficiaries skills they can use for life

Even during an emergency program, the goal of a training should be to improve beneficiaries’ ability to produce food that can supply extra income to their families and nutritious products for home consumption. If possible, trainers should go beyond teaching basic agronomic techniques to make sure beneficiaries understand how to engage in year-round vegetable production. This includes soil health principles and thinking about how to most effectively use and retain available water resources (19). Farmers would benefit from receiving trainings from field assistants skilled in creatively making use of local materials to construct gardens under non-ideal conditions.

References


Appendices

Appendix 1: List of interviewees

<table>
<thead>
<tr>
<th>Interview Number</th>
<th>Name</th>
<th>Organization</th>
<th>Development Practitioner (DP) or Vegetable Expert (VE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ralph Roothaert</td>
<td>World Vegetable Center</td>
<td>VE</td>
</tr>
<tr>
<td>2</td>
<td>Pepijn Schreinemachers</td>
<td>World Vegetable Center</td>
<td>VE</td>
</tr>
<tr>
<td>3</td>
<td>Mel Oluoch</td>
<td>World Vegetable Center</td>
<td>VE</td>
</tr>
<tr>
<td>4</td>
<td>Abiyot Mulugeta</td>
<td>Samaritan's Purse</td>
<td>DP</td>
</tr>
<tr>
<td>5</td>
<td>Getachew Tiruneh</td>
<td>Samaritan's Purse</td>
<td>DP</td>
</tr>
<tr>
<td>6</td>
<td>Zemede, Zewdie</td>
<td>CRS</td>
<td>DP</td>
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<td>Erin Lewis</td>
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<tr>
<td>8</td>
<td>Devendra Gauchan</td>
<td>Bioversity International</td>
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<tr>
<td>9</td>
<td>Krishna Mohan</td>
<td>CRS</td>
<td>DP</td>
</tr>
<tr>
<td>10</td>
<td>Silke Pietzsch</td>
<td>Action Against Hunger</td>
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<tr>
<td>11</td>
<td>Amin Uddin</td>
<td>Helen Keller International</td>
<td>VE</td>
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<tr>
<td>12</td>
<td>Dina Brick</td>
<td>CRS</td>
<td>DP</td>
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<td>13</td>
<td>Belay Terefe</td>
<td>GOAL Ethiopia</td>
<td>DP</td>
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<tr>
<td>15</td>
<td>Kyla Neilan</td>
<td>CRS</td>
<td>DP</td>
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<td>16</td>
<td>Adolfo Ruiz</td>
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<td>Ludger Jean Simon</td>
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<td>19</td>
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<td>20</td>
<td>Anne Turner</td>
<td>Independent Consultant</td>
<td>VE</td>
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<tr>
<td>21</td>
<td>Hassan Mndiga</td>
<td>World Vegetable Center</td>
<td>VE</td>
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# Appendix 2: List of Reviewed Projects

<table>
<thead>
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<th>Lead Organization</th>
<th>Donors</th>
<th>Dates</th>
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<tbody>
<tr>
<td>Tanzania</td>
<td>Vegetable seed kits for improvement of vegetable production and consumption for vulnerable households in Tanzania under OSRO/URT/001/UK</td>
<td>World Veg</td>
<td>FAO</td>
<td>Dec 2011-Aug 2012</td>
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<tr>
<td>Tanzania</td>
<td>Vegetable seed kits for flood affected urban and peri-urban farming households in Dar es Salaam under OSRO/URT/201/AUS</td>
<td>World Veg</td>
<td>FAO</td>
<td>Sept - Nov 2012</td>
</tr>
<tr>
<td>India</td>
<td>Disaster seed kit distribution by the World Vegetable Center in November 2014, and its impact on livelihoods of the flood affected communities of Puri district of Odisha, India</td>
<td>World Veg</td>
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Appendix 3: Case Study: Niger

Context

The Diffa region of Niger has been subjected to a steady influx of refugees, IDPs and returnees from Nigeria following the ongoing attacks carried out by Boko Haram since March 2013. The region has absorbed approximately 240,000 new inhabitants due to the conflict. The conflict has also significantly disrupted cross-border trade with neighboring Nigeria, further weakening the region’s food system and economic prospects. Located in the extreme southeast of Niger within the Sahel desert, Diffa is among the most unproductive agricultural areas in Niger and is especially prone to drought and famine.

**Diffa Seed System**

*Commercial vegetable seed is available in Niamey, but there are very few pathways for this seed to move from urban centers to rural areas*

The consultant visited two vegetable seed suppliers in Niamey, Agrimex and Sahelia. Both were subsidiaries of French companies supplying varieties adapted to tropical climates. Their largest purchasers are commercial farmers and traders who buy seed to resell it. NGOs provided a smaller, but significant, amount of sales for both companies. Agrimex reported that NGO business has grown steadily year to year, but Sahelia sees no clear trajectory in NGO contracts. Agrimex also has an annual contract with the government to supply seeds that are distributed to rural areas. Seed quality from these shops is mostly likely adequate, although it could not be tested directly. Shop owners stated that their reputation as a source of high-quality seed was extremely important to them, and packaging and expiration dates of merchandise were satisfactory.

*Vegetable seeds are primarily procured from local markets in Diffa, but quality is unreliable*

Farmers in Diffa purchase about 50% of their seed from local markets (CRS/Niger, 2016). Onion, cabbage, carrot and lettuce seeds are all intermittently available in the local and Nigerian markets utilized by inhabitants of the project area. The seed selection in markets is often limited so farmers must buy what is available. Farmers reported that seeds for some crops, such as carrot, were always too expensive to purchase, even though they are available. Farmers often do not trust the quality of the seeds they purchase from regional markets.

*Seed aid from the government and NGOs is currently a key source of high-quality vegetable seed*
Farmers use annual seed distributions from the government, and the sporadic distributions from NGOs, to attain high quality vegetable seed. Each year, the government distributes cabbage, carrot, potato, and lettuce seeds provided by the FAO to farmers. These distributions do not always arrive in time for planting so farmers consider them slightly unreliable, even though quality is considered adequate. Farmers consider seed fairs, such as CRS’s, an extremely important seed source since they offer the widest selection of seeds with guaranteed quality. Farmers appreciate both the diversity of seeds available and the guarantee of quality.

Diffa beneficiaries save seed from a small number of vegetable crops

Farmers are proficient at saving onion, local eggplant, and sweet potato seed, but do not have knowledge of how to save seed from other vegetable crops.

Project Details

The ERASeD projects sought to augment the gardens of farmers who were interested in expanding their vegetable production, but faced challenges accessing seed. Off-season market garden seed fairs were held in order to alleviate the economic and geographic difficulties these farmers faced in accessing seed. Seed fairs were held in conjunction with Government of Niger (GoN) district agricultural agents, who identified certified vendors and checked seed sources for quality parameters. Through the first ERASeD project from June 2016 - May 2017, 750 households in the communes of Maïné-Soroa, Chetimari, and Goudoumaria received seed at a seed fair. The following year, ERASeD2 supported an additional 1,000 households within the same communes. Vendors provided carrot, cabbage, onion, tomato, lettuce, sweet pepper, and potato seeds at each fair.

CRS’s project partner, DEMI-E, worked with beneficiaries at seed fair events and during home visits to conduct trainings on 1) the establishment and management of vegetable gardens, 2) compost production techniques, 3) production of bio-pesticides, and 4) the processing and conservation of garden products (cabbage leaves, sweet peppers, moringa leaves, and onions).

Beneficiaries were chosen based on their expressed willingness to increase their vegetable production. Two primary goals of the ERASeD projects were to diversify farmers’ vegetable production and increase the acreage devoted to vegetable farming.

Project Outcomes

**ERASeD increased acreage under vegetable cultivation by targeting farmers who were ready to expand**

ERASeD targeted beneficiaries who expressed an interest in expanding their vegetable production, but were limited by their
access to seed. In a region where access to water is limited, this approach successfully identified farmers who had invested in irrigation equipment and land next to a water point prior to the project providing seed. According to ERASeD reports, beneficiaries were able to increase their acreage by 70% on average.

**ERASeD has potential to boost diversity of vegetable gardens, but data is unavailable to demonstrate this**

Prior to the project, beneficiaries had limited access to the vegetables promoted by the project. Vegetable gardens were small and often did not contain more than one or two crops. The seed fairs provided farmers with a broad selection of seeds and encouragement to diversify their gardens. Project staff saw beneficiaries embrace this opportunity and increase the diversity of their gardens, but, without data on what beneficiaries were planting before and after the project, it is difficult to know what effect the program had on garden diversity.

**Direct consumption and marketing of vegetables both contributed to increased food security**

Because of the high levels of food insecurity and cereal deficiency within the project area, nearly all of the income generated from vegetable sales went to supplement beneficiaries’ cereal supply. Vegetable production therefore brought essential income into the household and increased beneficiaries’ access to staple foods during the lean season, as well as diversified diets through direct consumption of vegetables.

Perishability is a key distinguishing factor for vegetable marketability in Diffa. It frequently takes beneficiaries more than a day to travel to markets, and poor post-harvest conditions mean that crops rot along the way. Carrots, lettuce, local eggplants, and tomatoes all travel poorly and are primarily consumed fresh. Only vegetable crops that are dried after harvest (onion and cabbage) are usually sold by beneficiaries. Onions especially provide good monetary returns and can be sold for significant stocks of cereal grains. Beneficiaries reported consuming about half of their onions and cabbages fresh and preserving the rest for future consumption and sale.

**Men decided the fate of most vegetable yields, including what is used for home consumption**

Many of the seeds purchased by beneficiaries, including those purchased by women, were planted in communal plots with labor supplied by the entire household. Although these plots benefited the household at large, it is men who ultimately decided whether the produce will be eaten directly or sold. The men interviewed said that they prioritize feeding their families first, and it is up to them to determine which vegetables their families will consume and in what amounts. Since women typically farm very small plots, the project encouraged them to increase their plot size and farm close to one another for group support. Women’s plots are used almost exclusively for home consumption, but they report that their gardens are
insufficient to satisfy their household’s vegetable needs.

*Nutrition education was not prioritized by CRS, but women received nutrition messages from the Government of Niger*

Women receive nutrition education from a Government of Niger health agent when they attend a health clinic to treat their malnourished children. This information includes how to use garden produce to properly feed young children.

*ERASeD was successful at increasing farmers’ access to preferred vegetable crop seeds in the short term, but farmers remain with a seed gap in the long term*

Farmers were unequivocally appreciative of the seed they purchased through the ERASeD seed fairs, but did not feel that the seed fairs alleviated their long term seed needs. Many beneficiary farmers will wait for the next seed handout to plant gardens as large, and as diverse, as the ones they were able to plant during the ERASeD project. Farmers supplemented their seed aid with seed from local markets, but this seed remains economically inaccessible and of poor quality. Beneficiaries learned proper seed storage techniques through CRS/DEMI-E trainings, which helped farmers make the most of the seed they received, but seed saving techniques were not possible due to the difficulty of saving seed from the vegetable crops featured in the seed fairs.

**Lessons Learned**

*Practitioners can help beneficiaries maximize their intake of fresh vegetables*

- Beneficiaries’ gardens are most likely the primary source for vegetables they consume. The vegetable seed options provided should support a well-rounded diet. Seed selection can be done in collaboration with a nutritionist to close nutrient gaps existing in beneficiaries’ diets.
- Project staff can encourage beneficiaries, especially male beneficiaries, to purchase seeds for crops that are likely to be eaten directly. These crops may be less desirable compared to marketable crops unless beneficiaries are told about their health benefits prior to seed fair events.
- Project staff can help beneficiaries determine the amount of seed they need to purchase to provide their household with an adequate amount of fresh vegetables, as well as training on producing vegetables for more months of the year.

*Practitioners can help beneficiaries maximize the benefits they receive from selling crops*

- Market crops provided by the project should be profitable and should meet market specifications.
- ERASeD taught farmers post-harvest techniques that improved storage life and transportability and made farmers more competitive in marketplaces.
Farmers need to be able to access vegetable seeds after the project has completed

ERASeD brought in seed options that were desirable to the beneficiaries, but access to this seed is still an issue due to financial and physical barriers.

ERASeD tried to encourage greater seed access by inviting local vendors with sale points in Diffa and surrounding markets to seed fairs. During the seed fair, vendors shared their contact information with beneficiaries. Project staff and local agricultural officers encouraged beneficiaries to purchase from these seed vendors, but beneficiaries are hesitant to take advantage of these relationships. Seed fairs are potential opportunities to create longer term ties between seed vendors and villages, but seed prices and seed quality need to be agreeable to the farmers for these relationships to be built.

The project should include some vegetable crops with easily saved seed. Indigenous vegetable species are promising in this regard because of their suitability to the local climate and the culinary traditions that already exist around them, but these vegetables first have to be identified and seed saving techniques developed if they are not already known.

Nutrition education is needed for both men and women equally in order for vegetable production to be prioritized

Nutrition education was not included in the ERASeD project, but would help beneficiaries select seeds that can nutritionally benefit their families. Since men are the primary decision makers on what vegetables are planted and how resulting yields are used, then men need targeted nutrition training to ensure their households consume an adequate amount of vegetables.

Monitoring and evaluation plans need to show how seed improved livelihoods and nutrition

- Onions in particular are valued by these communities as a cash crop; onion sales can be tracked to determine the monetary value this single crop contributed to beneficiary households.
- ERASeD staff carefully measured increases in vegetable acreage, but could also ask beneficiaries the number of vegetable crop they grew the year before the project and then follow up with the same question next year to determine if beneficiaries grew a greater diversity of vegetables during the project year. This information will help determine the extent to which beneficiaries were...
actually able to temporarily increase the diversity of their gardens.

- Since households also improved their access to staple crops, the project could also use the Household Hunger Scale (HHS), which records the prevalence of households with moderate or severe hunger, or the Household Food Insecurity Access Scale (HFIAS), to record changes in household access to food. Either measurement would provide an indication of how households changed their consumption of staple crops during the project time frame.
Appendix 4: Case Study: India

Context

Kanas and Nimapada Blocks in Odisha state of northeast India are prone to floods during the monsoon season. Every 2-3 years, these monsoons result in severe flooding and massive winds that uproot trees, knock down power lines, and destroy mud and bamboo houses. During years with large storms, swelling rivers climb higher than the low lying paddy rice and commercial vegetables fields to encroach on houses and roads. The storm water can take a full month to recede and leaves fields waterlogged and unsuitable for planting for weeks. Communities in flood-prone parts of Odisha state are vulnerable in the face of these routine, but unpredictable, floods.

Odisha Seed System

Women in these communities have low accessibility to quality vegetable seed, even during non-flood conditions. Improved seed is available in larger markets, like Bhubaneswar, but women cannot access these markets. Bicycle traders come to the villages to sell seed directly to women for their home garden, but by this time the original packaging has been opened and seeds are often adulterated. It is well known that traders mix vegetable seeds with older seeds at each selling point, but women still buy from bicycle traders due to a lack of alternatives. Self-saved seed is often of even poorer quality and does not cover all types of desired vegetables. In flood years when garden crops are washed away, women’s seed supply is also washed away since many women do not reserve seed supplies to use the following year.

Project Details

CRS initiated a 3 year project funded by COFRA to improve the disaster resiliency of these communities, but, during the course of the COFRA project, also responded to three severe floods with emergency vegetable seed distributions. Seed distributions occurred in 2011, 2013, and 2014.

In 2011, CRS and World Veg first responded to a flood by distributing 6,000 seed packs containing six quick-growing leafy vegetables (spinach, kang kong, fenugreek, leafy mustard, and two varieties of amaranth). Both agencies agreed that quick-growing leafy vegetables should be emphasized to fill the immediate gap in vegetable access after a flood. The positive community reception to these emergency seed packs convinced CRS to include a vegetable component in their 3 year-long COFRA-funded project to improve the resiliency of these communities to future floods. The main agricultural objective was to introduce flood-resilient
home garden technologies and vegetable varieties through beneficiary training and demonstration gardens.

The COFRA project planned for a slow introduction of new varieties and techniques, but a cyclone in 2013 forced a new approach. CRS and World Veg decided to implement a blanket dissemination of ~19,000 emergency seed packs using the lessons they had learned following their 2011 seed dissemination. In part, these lessons led to more diverse seed pack that included pulses and fruit vegetables, like pumpkin, to extend the harvest period.

Seed pack distribution was organized by the Society for Women Action Development (SWAD), a local NGO operating in Odisha. During and after this distribution, project staff from SWAD closely followed up with beneficiaries to reinforce messages on best agronomic practices. When a flood hit again in 2014, another 19,000 seed packs containing mixed leafy greens, pulses, and fruit vegetables were distributed.

**Project Outcomes**

*Beneficiaries planted seed and were able to consume vegetables from their gardens immediately following floods*

Project staff concluded that providing vegetable seeds soon after the flood was a very effective intervention for improving family food production. Monitoring of beneficiaries in the 1-3 months following the flood revealed that almost 100% of households planted the seeds they had received and at least 90% of households were consuming vegetables from their gardens.

*Emergency vegetable seed distributions had limited impact on their own, but were very powerful when combined with training and intensive follow up*

Project partners agreed that the program’s success was largely due to the seed distributions working in tandem with the extensive training and home follow up visits delivered by SWAD. SWAD provided a brief presentation using pictures during seed distribution events, but also detailed trainings and demonstration gardens as part of the three year COFRA project. Training events that were originally planned for the COFRA project proved invaluable as support for the emergency seed distributions. These trainings were needed to assist the beneficiaries in adoption of improved home garden practices, including the use of new bag garden technologies that allowed beneficiaries to plant seed early enough that they could harvest vegetables during the critical period of vegetable shortage following a flood.
SWAD also conducted trainings in seed harvesting and storage that allowed beneficiaries to save seed from their seed pack vegetables. Women saved certain seeds before the project, but germination rates were extremely low. Women learned better seed harvesting and storage techniques from SWAD staff, which they applied to all the crops in the seed pack. SWAD staff shared that they still see the bean and pumpkin varieties introduced two years earlier when they visit the communities.

**Two “new” crops were introduced to beneficiaries, but adoption has been mixed**

Two “new” crops, kang kong and spinach, were included in the emergency seed packs. Project staff thought it was highly unlikely these crops would have been adopted without training and follow up visits by SWAD and, even with training, the two vegetables were not equally successful.

**Kang kong** was not new to communities, but, prior to the program, communities only consumed a variety that is collected by women from local ponds. Kang kong was only cultivated by a few households with access to a water body. World Veg was interested in disseminating a new kang kong variety that they believed would be popular given its ability to grow in an upland environment. This variety is highly prolific and not as fibrous as what the community had been collecting previously. Beneficiaries quickly adopted the new variety, stating that it was easy for them to grow, provided a long lasting source of leafy vegetables for their families, and tasted better than the variety they had been collecting. Beneficiaries learned that they could grow the kang kong in horizontal bag gardens during flood seasons and then transplant cuttings of kang kong to their fields when the risk of flooding was past. All of these traits combined made the new kang kong variety very attractive to beneficiaries.

**Spinach**, on the other hand, was not consumed locally and was initially considered by the communities to be a “rich man’s food.” Beneficiaries had seen and occasionally eaten spinach, but had never grown it. It is often considered too expensive by beneficiaries to incorporate into their diet and is not common in local markets. As a result of this limited exposure, cooking knowledge was poor and people

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*Kang kong growing in a horizontal bag garden and okra growing in a vertical bag garden.*

**Bag gardens were essential to achieving program goals**

In 2011, CRS and WorldVeg saw that fields remain flooded for at least a month after a storm event, hampering farmers’ ability to plant vegetables until storm waters recede. A handful of flood-resilient home garden technologies were piloted during the COFRA project, and bag gardens proved to be highly effective in surviving the floods. Beneficiaries were taught to build bag gardens using local materials and to put them in a high place around their homes in preparation for a potential flood. Without training in this new gardening technique, beneficiaries would be unable to plant vegetable seeds for a full month after a flood, even if seed was provided to them.
were unsure if they liked its taste. However, World Veg strongly advocated for the introduction of spinach to these communities because of its nutritional value.

Beneficiaries appreciated the spinach introduced to them, but it has not had the same success as kang kong. Project staff and beneficiaries learned over the course of the program that spinach can be challenging to grow; germination rates are poor under adverse weather conditions, such as strong winds or rains. These technical challenges, combined with a lack of strong incentive to adopt spinach as a new crop, has led to a slow adoption by beneficiaries. SWAD’s agronomic advice and constant reinforcement of the nutritional value of spinach has boosted the motivation of some beneficiaries, but spinach still does not have as wide an acceptance as kang kong.

*Blanket seed distributions complicated the COFRA project’s original goal of building a resilient seed system*

When emergency seed packs were distributed post-flood, many of the COFRA activities to create a resilient seed system were put into question. COFRA planned to create a more resilient seed system in Odisha by 1) demonstrating the utility of improved varieties in their trainings and demonstration gardens and 2) teaching women proper seed saving methods to ensure their access to these varieties. Peer leaders and demonstration plots were selected as a way to diffuse information into the community, and women’s groups were going to be formed to sell saved seed to others in the community.

1) Blanket seed distributions stimulated beneficiaries’ interest in the techniques demonstrated during COFRA trainings and demonstration gardens

Blanket seed distributions were an effective way to promote new flood-resistant varieties and improved practices. Prior to the seed distributions, households complained that they could not use the new techniques because they did not have improved seed. SWAD staff were able to encourage households to try the new techniques with the improved seed they had received, and there was a much greater adoption of improved seed and techniques as a result. Women were also motivated to preserve the high-quality seed they had received using the new techniques they had been taught. Many women reported that their ability to save this high-quality seed was a major benefit to participating in the project.

2) Blanket seed distributions potentially negated the need for women’s seed groups

After multiple blanket seed distributions within their target communities, project staff wondered if women would still organize into seed groups to sell improved varieties now everyone in the community had received these varieties for free. They also wondered if these groups were necessary now that beneficiaries had been taught how to store these seeds themselves.
Blanket seed distributions helped create awareness and appreciation of new flood-resistant varieties within the communities, but overall proved to be a distraction that turned project staff’s attention away from investing in targeted activities to improve Odisha’s seed system resiliency.

Anecdotal reports exist of beneficiaries selling produce, but these sales are not recorded

Income generation was never considered a priority of the COFRA project; home gardens are not typically thought of as a commercial activity, and the women targeted by this project are not commercial farmers. Project staff also believed that blanket seed distributions would destroy women’s ability to market surplus produce and further dampening the project’s impact on income. Even when beneficiaries requested crops that are nutritious but also marketable—pumpkin, beans, and eggplant—to be in the seed packs, project staff thought that the small amount of seed provided (5g) would be too small for anything more than home consumption. However, as with many vegetable projects, anecdotal accounts of beneficiaries selling surplus produce trickled back to the project staff. Despite the project’s strong focus on nutrition, income generation was a secondary impact that is very difficult, if not impossible, to remove completely.

When the seed packs shifted from containing only quick-growing leafy vegetables with low commercial value to a mix of leafy greens, pulses, and fruit vegetables, then the project impact also shifted. Project staff and beneficiaries agreed that the new mix of vegetables extended the nutritional benefits of the seed pack, but beneficiaries also saw these new crops as marketable and thus of additional value to them. SWAD staff reported that beneficiaries would barter their pumpkins and beans with traders to receive potatoes and onions when they needed them. SWAD estimated that they saw 10% of beneficiaries selling or bartering their excess pumpkins and beans. In changing the seed pack composition, beneficiaries introduced an income impact into the project that was not being measured.

Project evaluations focused on seed and agricultural indicators and did not include diet or income generation indicators

CRS followed up with beneficiaries every month from when they received the seed to when their gardens were finished as part of their routine monitoring activities. While at the household, field staff inquired if beneficiaries had planted the distributed seeds, if they had established a sack garden, if their crops looked healthy, and if they were using improved practices. Data was collected using simple yes/no questions for easy analysis on what crops were being grown by households and what practices were being adopted. Multiple quantitative and qualitative evaluations were also done mid-project and post-project that determined the seed distributions had been timely, the quality of the seeds was good, and the variety selection appropriate. While these are important seed and agricultural indicators, the information provided in the evaluations of the COFRA project do little to assess any impact the seed distributions had on beneficiaries’ diets or ability to generate new income.
Lessons Learned

Consultations with communities in between seed distributions allowed for a shift in strategy

Follow up meetings with communities after 2011 revealed that, while communities enjoyed the quick-growing leafy vegetables supplied to them, they preferred a mix of crops with different harvest periods. Beneficiaries wanted crops with an extended harvest and enough variety to allow them to cook the mixed vegetable dishes they preferred, which feature fruit vegetables like eggplant and pumpkin as well as leafy greens. Project staff recognized the nutritional benefits of prolonging the vegetable harvest period and modified their seed pack approach to include two fruit-bearing vegetables, one legume, and three quick growing leafy vegetables. These modifications included beneficiaries in the project decision making process and improved the project’s ability to influence diets and income generation though seed distributions.

Trainings and extensive home visits were needed to improve home garden practices and introduce new technologies

Even though the women in the program had previously planted home gardens, they were not included in the men’s commercial vegetable production and had limited knowledge of best practices. Bed preparation, line sowing, staggered sowing and harvesting, and proper harvesting techniques were all simple yet effective practices that improved yields. Training beneficiaries in improved practices improved garden yields and the harvest period for nutritious vegetables. Trainings and home visits were also essential to introduce bag gardens, which allowed beneficiaries to grow vegetables during the most critical period following a flood.

Emergency seed packs can be used to promote new crops and varieties, but crop selection must be done carefully

Kang kong was more suited to rapid farmer adoption in Odisha because of its hardiness and cultural appropriateness for the community. Spinach required more technical skills from farmers and needed reinforcement of nutritional messages for it to be accepted by the community. It is less likely that farmers would adopt a new crop like spinach as part of an emergency vegetable intervention since strong agronomic skills are required and the crop is not inherently valuable to the beneficiaries. Crops that are easy to grow and already incorporated into beneficiaries’ diets are more likely to be adopted than knowledge-intensive crops that require new recipes and changing culinary preferences, although training can help increase adoption rates.

Embed emergency seed distributions into larger seed system strengthening objectives
Seed distributions were not well integrated into longer-term objectives to strengthen Odisha’s seed system. In hindsight, project partners realized that seed packs could have been more fully integrated into this original objective. Instead of sourcing seed from large traders that are inaccessible to small farmers and who have little incentive to market to them, project partners realized they could have explored seed traders closer on the seed value chain to the beneficiaries. These seed traders are not currently selling directly to these communities, but project staff could have used the project to explore this untapped consumer base. Project staff know that they produce small seed packs for other government programs so it is feasible that they would be interested in producing small packs for home garden use. Even though the emergency seed distributions were primarily intended to fill an acute seed gap, project staff realized this activity could also be used strategically to advance larger seed system resiliency objectives.

*Vegetable gardens often provide some kind of monetary benefit to households, even if home gardens are not typically considered a “commercial” activity.*

In smallholder settings, beneficiaries consider home gardens as both food for their families and a source of supplemental income. Gardens also provide items that can be used for bartering or allow households to save on food costs. While the monetary benefits of the home gardens in Odisha are most likely not as widespread as the food security benefits, project staff may still want to understand further how the gardens impacted households monetarily and if there is a way to increase these benefits in the future.

*Measuring changes in diet requires a strategic evaluation plan*

Even though a major objective of the seed distributions were to impact food security within flood-affected households, it is difficult to draw conclusions on this outcome given the lack of data. The strongest evidence that seeds improved household diets is the anecdotal evidence reported by beneficiaries during focus group discussions; beneficiaries frequently said they now have vegetables to complement the pulses and potatoes they store in anticipation of higher prices following a flood. Measuring dietary diversity or food consumption scores during the critical three months of food insecurity following a flood would have provided much more robust evidence of nutritional impact than focus group information.