

# Spillover Effect of SPRING/Bangladesh Farmer Nutrition Schools among Non-Project Beneficiaries

## A Qualitative Study





Spillover Effect of SPRING/Bangladesh  
Farmer Nutrition Schools among  
Non-Project Beneficiaries  
A Qualitative Study

## **ABOUT SPRING**

The Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) project is a seven-year USAID-funded cooperative agreement to strengthen global and country efforts to scale up high-impact nutrition practices and policies and improve maternal and child nutrition outcomes. The project is managed by JSI Research & Training Institute, Inc., with partners Helen Keller International, The Manoff Group, Save the Children, and the International Food Policy Research Institute.

## **RECOMMENDED CITATION**

SPRING. 2017. *Bangladesh: Spillover Effect of Farmer Nutrition Schools among Non-Project Beneficiaries*. Arlington, VA: Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) project.

## **Abstract**

From 2012 to 2017, SPRING implemented community-based, multi-sectoral, integrated nutrition programs focused on households with pregnant and lactating women (PLW) and children under 2 years of age in 40 *upazilas* in Barisal and Khulna divisions. During these five years, the program reached over 125,000 PLW through its farmer nutrition school (FNS) program, promoting small, doable actions to improve nutrition and hygiene. In addition to helping FNS participants, the interventions had a significant positive impact on non-FNS community members. This study examines that impact. Because the promoted practices spread easily beyond direct program beneficiaries, we believe they have great potential for scalability and sustainability.

## **DISCLAIMER**

This report is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the terms of the Cooperative Agreement AID-OAA-A-11-00031, SPRING), managed by JSI Research & Training Institute, Inc. (JSI). The contents are the responsibility of JSI, and do not necessarily reflect the views of USAID or the U.S. Government.

## **SPRING**

JSI Research & Training Institute, Inc.  
1616 Fort Myer Drive, 16th Floor  
Arlington, VA 22209 USA  
Phone: 703-528-7474  
Fax: 703-528-7480  
Email: [info@spring-nutrition.org](mailto:info@spring-nutrition.org)  
Internet: [www.spring-nutrition.org](http://www.spring-nutrition.org)

**COVER PHOTOS:** SPRING/Bangladesh

# Contents

---

Acknowledgements ..... vii

Acronyms and Abbreviations..... ix

Executive Summary ..... 1

Background ..... 3

Objectives ..... 5

Methodology..... 7

Limitations ..... 9

Key Findings..... 11

Analysis and Discussion ..... 51

Conclusion ..... 55

References ..... 57

Annex 1. Practices Promoted by Farmer Nutrition Schools..... 59

List of Tables

Table 1. List of villages where focus group discussions were conducted ..... 7

Table 2. Categories of spillover changes to horticulture production ..... 13

Table 3. Benefits from horticulture ..... 19

Table 4. Categories of spillover changes in poultry production ..... 26

Table 5. Benefits of poultry-rearing..... 29

Table 6. Spillover changes in aquaculture ..... 34

Table 7. Benefits from aquaculture discussed in the FGDs..... 35

Table 8. Spillover changes in nutrition and health ..... 38

Table 8. Benefits from nutrition and health practices ..... 43

Table 9. Spillover changes for handwashing ..... 45

Table 10. Benefits from tippy taps and handwashing..... 47

Table 11. Analysis of Benefits for Adopting FNS Practices..... 52



# Acknowledgements

---

SPRING would like to thank the community participants for giving their time for focus group discussions and sharing their experiences. Without their generosity, this study would not have been possible. SPRING also thanks HKI staff for their assistance in diligently facilitating and transcribing the focus group discussions. SPRING is grateful to Dr. Meredith Jackson-deGraffenried, who helped with the analysis and writing of the report.

Many people reviewed the drafts of this report and made helpful suggestions for improvements, including Aaron Hawkins, Mohammed Ali Reja, Bridget Rogers, Barry Chovitz, Agnes Guyon, and Altrena Mukuria.





# Acronyms and Abbreviations

---

ANC	antenatal care
DOI	diffusion of innovation theory
EHA	essential hygiene actions
ENA	essential nutrition actions
FGD	focus group discussion
FNS	farmer nutrition school
HBM	health belief model
HFP	homestead food production
HKI	Helen Keller International
IFA	iron-folic acid
IPM	integrated pest management
PNC	postnatal care
SAAO	sub-assistant agriculture officer
SCT	social cognitive theory
SPRING	Strengthening Partnerships, Results, and Innovations in Nutrition Globally
UF	union facilitators
USAID	U.S. Agency for International Development



# Executive Summary

---

The Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) project began activities in Bangladesh in April 2012. SPRING received support from the Government of Bangladesh's Ministry of Health and Family Welfare and the Ministry of Agriculture, which allowed us to work within existing systems and programs and to create new interventions. SPRING operated through the 1,000-day approach, focusing on the critical window from the beginning of pregnancy through a child's second birthday. As such, pregnant and lactating women (PLW) and children under two were the primary targets of SPRING's interventions. SPRING implemented activities in 40 *upazilas* in Barisal and Khulna divisions, part of the Feed the Future zone of influence.

## The Spillover Effect: Households Influenced

The study looked at spillover effects in **16** FGDs in **15** villages across **4** districts. The findings from the transect walks that were used to select FGD participants showed that at least **8–10** households around each FNS village have been influenced to adopt practices at varying levels. Therefore, it is possible that SPRING influenced at least **8–10** households in each FNS village throughout our implementation area. With approximately **6,421** FNS throughout SPRING's zone of influence, that could translate to over **64,000** additional households that have adopted practices from the SPRING FNS, despite not participating in the program.

SPRING implemented community-based, multi-sectoral, integrated nutrition programs from April 2012 to June 2017. During these five years, the program reached over 125,000 PLW through its farmer nutrition school (FNS) program, promoting small, doable actions to improve nutrition and hygiene. Our research and program monitoring data have shown that SPRING's interventions were effective in improving women's dietary diversity, women's empowerment, sustained handwashing and hygiene practices, and other nutrition-related indicators. Throughout the program, there was strong evidence of these effects "spilling over" to non-FNS participants—people who had not been targeted by SPRING and did not participate directly in SPRING interventions.

Having observed that families living near its FNS beneficiaries adopted many of the practices promoted through FNS, SPRING decided that a structured analysis could provide a better understanding of which practices non-FNS community members were adopting (i.e., "spillover") and why they chose to adopt these practices.

The objectives of this study were to—

- identify which practices non-FNS community members adopt from FNS participants
- determine why non-participants adopt FNS practices
- define what benefits non-participants perceive from adopting FNS practices
- identify the challenges faced by non-participants in adopting FNS practices.

The study examined the nutrition and hygiene knowledge and behaviors of non-FNS participants, comparing behaviors prior to exposure to FNS teachings and after. We gleaned this information during focus group discussions (FGDs) in villages where FNS had taken place. SPRING facilitated 16 FGDs, each consisting of between eight and ten participants who were not part of SPRING FNS activities. Overall, the FGDs spoke with 157 women. These participants were selected by the FGD facilitators based on their experience with FNS and their adoption of any of the FNS-recommended practices. The study draws on Social Network Theory and Social Cognitive Theory to better understand how and why some behaviors spilled over.

Once they saw the benefits of the new practices, non-FNS participants were motivated to take up new behaviors. The spillover effects were stronger where the perceived benefits were greater. The study assesses behaviors related to horticulture, poultry rearing, aquaculture, nutrition and health, and hygiene. The FGDs also discussed the perceived benefits or challenges of different behaviors to better understand the motivations for non-FNS participants to adopt or not adopt new practices.

Behaviors that were more widely adopted by FGD participants included increased gardening, increased consumption of eggs, increased early breastfeeding, and improved handwashing practices. The FGS participants reported on the perceived benefits of these practices, such as improved family health, increased gardening yield, and long-term cost savings. FGD participants also reported on the challenges of certain practices, such as lack of materials for gardening, the cost of raising chickens, or poor access to a pond for fish farming. The report details these benefits and barriers to practices.

The findings from the discussions with non-FNS participants from villages where farmer nutrition schools had occurred underscore the potential scalability and sustainability of the FNS practices through the demonstrated capacity to spread beyond just the project beneficiaries. The FNS participants modeled new knowledge and skills and practices to their neighbors and relatives and spread these directly and indirectly. The perceived benefits that motivated non-FNS women to adopt new practices centered on increased yields and increased access to and availability of diverse and nutritious foods, cost and time savings, income generation, and improved health and nutrition. Overall, the non-FNS participants were motivated to adopt new behaviors or practices because the perceived benefits were substantial and outweighed the challenges or barriers to change. Once they recognized the benefits of the new behaviors, their own perceived self-efficacy was a driver of change.

# Background

---

The USAID-funded Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) project focuses on preventing stunting in the first 1,000 between a woman's pregnancy and her child's second birthday. In Bangladesh, the SPRING project uses the essential nutrition actions (ENA) and essential hygiene actions (EHA) framework to deliver high-impact nutrition interventions to increase dietary diversity, particularly among pregnant and lactating women and children under two years of age. SPRING operates in 40 upazilas (sub-districts) in Barisal and Khulna divisions, located in the USAID Feed the Future Zone of Influence in the southern coastal area of Bangladesh. The project aims to strengthen the delivery of ENA/EHA at all health contacts within the health system, and integrates ENA/EHA messages during the Government of Bangladesh Sub-Assistant Agriculture Officer (SAAO) sessions and during SPRING-facilitated Farmer Nutrition School (FNS) gatherings. Through the FNS, 20–25 pregnant and lactating women and mothers of children under two gather on a bimonthly basis to learn improved food production techniques and ENA/EHA practices through practical, hands-on training.

This study examines the spillover effects (i.e., the adoption of FNS practices by community members who did not participate in an FNS) of SPRING activities on non-FNS community members residing in the same communities where an FNS occurred. For the purposes of this report, it is important to note that "spillover" refers to those women who adopted practices promoted by the FNS program. This could have been done directly, through conversations with SPRING staff and FNS beneficiaries, or more indirectly, through observations of the FNS participants or the FNS sessions.

For this study, we used a definition of food and nutrition security built from the definition set forth in the 1996 World Food Summit Plan of Action and modified by UNICEF: "Food and nutrition security is achieved when adequate food (quantity, nutritional quality, safety, socio-cultural acceptability) is available and accessible for and satisfactorily used and utilized by all individuals at all times to live a healthy and active life" (FAO 1996). The concept of food and nutrition security is based on three pillars (Asian Development Bank 2013):

- food availability: sufficient quantities of food available on a consistent basis
- food access: sufficient resources to obtain appropriate foods for a nutritious diet
- food use: appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation.

SPRING's focus on reducing stunting in the first 1,000 days is tied to improving the food and nutrition security of households. The information gathered here will aid in understanding the role that a nutrition project with a social and behavior change communication component, combined with nutrition-sensitive agriculture and strengthened nutrition services delivery, can have in improving food and nutrition security. In particular, it will focus on why people adopt new practices that lead to improved food and nutrition security, even when they are not project participants and receive no targeted training or inputs.

This study draws from a number of behavior change theories, including the Health Belief Model (HBM) (Stretcher, V. and Rosenstock, I.M. 1997), Social Cognitive Theory (SCT), Diffusion of Innovation (DOI) theory, and Social Network Theory. The HBM posits that adoption of new behaviors<sup>1</sup> is influenced by perceived seriousness (how bad will the situation be if the behavior is not adopted), perceived susceptibility (personal risk), perceived benefits,

---

<sup>1</sup> Throughout this report, the terms "behavior" and "practice" are used interchangeably

and perceived barriers. These perceptions are affected by modifying variables (such as culture, education level, past experiences, skill level, and motivation), cues to action (events, people, and things that motivate behavior change, such as advice from others and mass media campaigns), and self-efficacy (belief in one's own ability to do something). For an individual to be motivated to adopt a new practice, he or she needs to believe the benefits of the new behavior outweigh the consequences of continuing old behaviors. Later, self-efficacy was added to the HBM, after it was introduced in social cognitive theory. Self-efficacy refers to the level of a person's confidence in his or her ability to successfully perform a behavior.

The SPRING project promoted small, doable actions, particularly for nutrition and hygiene, supported by nutrition-sensitive agriculture, and improved nutrition services delivery. Women's self-efficacy and agency may be strengthened by equipping them with knowledge and skills to perform small, doable actions. Social Cognitive Theory, along with Social Network Theory, also posits that individuals make changes within a social environment. While SCT accounts for past experiences and sociocultural norms as influencers of behavior, DOI breaks down change at the community level into groups of adopters: early adopters, early majority, and late majority, among others. The FNS participants who are practicing the recommended behaviors are considered "early adopters" and "the early majority." Spillover may occur to their non-FNS neighbors, who become a late majority. In such cases, their neighbors will have seen tangible results, observed new sociocultural norms of women earning income at home with self-efficacy and agency to care and provide for their families, and perceive these as benefits that outweigh the risk and consequences of not adopting change.

# Objectives

Having observed that families living near its FNS beneficiaries adopted many of the practices promoted through FNS, SPRING decided that a structured analysis could provide a better understanding of which practices non-FNS community members were adopting (i.e., “spillover”) and why they chose to adopt these practices.

The objectives of this study were to—

- identify which practices non-FNS community members adopt from FNS participants
- determine why non-participants adopt FNS practices
- define what benefits non-participants perceive from adopting FNS practices
- identify the challenges faced by non-participants in adopting FNS practices.

The main practices SPRING’s FNS program promotes can be roughly grouped into four main categories.

Category	Key Practices
Essential Nutrition Actions and Essential Hygiene Actions	<ul style="list-style-type: none"> <li>• Nutrition for children from birth to age 2</li> <li>• Nutrition for pregnant and lactating women</li> <li>• Critical junctures for washing hands</li> <li>• Keeping the environment clean</li> </ul>
Horticulture	<ul style="list-style-type: none"> <li>• Diversifying horticulture</li> <li>• Improving production of horticulture</li> <li>• Promotion of improved consumption of diversified horticultural products</li> </ul>
Poultry Rearing	<ul style="list-style-type: none"> <li>• Increasing number of poultry birds</li> <li>• Improving production of poultry</li> <li>• Promotion of improved consumption of poultry products</li> </ul>
Aquaculture	<ul style="list-style-type: none"> <li>• Increase amount and diversity of fish</li> <li>• Improving production of fish</li> <li>• Promotion of improved consumption of fish</li> </ul>





# Methodology

We conducted focus group discussions (FGD) to explore the adoption of SPRING FNS practices by non-FNS participants and to better understand the motivating factors (i.e., the perceived benefits) that drive non-FNS participants to adopt and continue new practices. Fifteen villages were selected as study sites across Khulna, Jessore, Barisal and Bhola districts. We conducted one FGD in each of 14 villages and conducted two in the fifteenth village. In each village (community), an FGD was conducted with non-FNS participants who had been selected through a transect walk. For the transect walk, the FGD facilitators, who are both Helen Keller International (HKI) staff and short-term employees hired for this study, began by selecting the first FNS participant house they came upon after entering the village along the main road that intersects the village. The facilitators then walked no more than five kilometers from the FNS participant's house, away from the main road, following a road or path and stopping at each house encountered. There, they asked to speak to a woman between the ages of 18 and 49 about practices taught during FNS, as well as to look for gardens or tippy taps that would indicate that FNS practices were being followed.

**Table 1. List of villages where focus group discussions were conducted**

District	Upazila	Union	Village
Barisal	Banaripara	Chakhar	Ashurail
Barisal	Banaripara	Chakhar	East Arsulia
Barisal	Bakerganj	Rangasree	Bakarkathi
Barisal	Bakerganj	Rangasree	Imamgathi
Bhola	Bhola Sadar	Purbo Elisha	Guptomunshi
Bhola	Bhola Sadar	Razapur	Char Mansha
Bhola	Lalmohon	Badarpur	Kacchapia (Chandrima Abashan)
Bhola	Lalmohon	Badarpur	Kacchapia (Dhumketu Abashan)
Jessore	Bagherpara	Bashuari	Kismat Mahmudpara
Jessore	Bagherpara	Darajhat	Pukuriyavita
Jessore	Jhikargaccha	Bakhra	Alipur
Jessore	Jhikargaccha	Shonkorpor	Shonkorpor
Khulna	Dumuria	Dumuria Sadar	Fulbaria
Khulna	Dumuria	Dumuria Sadar	Kholshi

District	Upazila	Union	Village
Khulna	Phultala	Damador	Dakhindihi
Khulna	Phultala	Damador	Damudor Hajrapara

If the woman had adopted any of the recommended practices, she was invited to participate in an FGD for that village. The transect walk concluded when at least 10 participants were identified. Each participant provided informed consent. Four FGDs were conducted in each of the four districts to include villages that had graduated from different years of the FNS, from 2012 to 2015. Each FGD had 8–10 non-FNS women, for a total of 16 FGDs with 157 participants all together. Two facilitators (one moderator and one assistant) conducted each FGD. The assistant took notes and the FGD was recorded and transcribed later in Dhaka by the facilitators.

To begin data analysis, each FGD transcript was coded using the common qualitative analysis method of creating codes based on the content of the text.

Once the narrative was coded, the codes were grouped, or condensed, to allow for a more in-depth analysis, putting similar statements together to see how non-FNS participants were talking about the FNS practices and to identify common themes running through the narrative.

## Limitations

---

Each FGD covered all areas of SPRING-promoted practices (i.e., horticulture, poultry production, aquaculture, nutrition, and hygiene), which means the discussions were broad, but not deep. More focused, intensive discussions could have gleaned additional information. The FGDs provide insight into what motivates behavior and the challenges to adopting practices, but it is not possible to generalize or enumerate the adoption of these behaviors as the facilitators did not visit each household to observe actual practices or collect individual recall data. Finally, we cannot conclude outside of the radius of households (usually no more than five kilometers) how far the spillover effect extends.



# Key Findings

---

## Introduction

The FGD guide was divided into technical sections, following the sequence of the training curriculum of the FNS. A general/introductory section allowed facilitators to begin the discussion by asking how the non-FNS participants had learned about the farmer nutrition schools and what they knew about them. The discussion then focused on the technical areas, starting with a series of questions about horticulture, then poultry, aquaculture, nutrition, and hygiene. The findings are presented below following the same order.

## Information Channel

Each FGD opened with a round of introductions and icebreakers. The facilitators then asked if anyone knew someone who had attended at farmer nutrition school and how they knew that people from their village were attending the schools.

The villages are small clusters of several hundred houses, and, as participants in the FGDs described, everyone knows what everyone else from the village is doing. Some of the non-FNS participants had heard through village gossip that some community members were attending a school and learning new skills (e.g., improved gardening, poultry, fish culture) and about nutrition and health. The non-FNS participants either sought out those women attending the FNS or the SPRING FNS staff who conducted the schools, had informal discussions with an FNS participant, or went to listen to an FNS session directly.

*This brother [SPRING field supervisor] often visits our village and teaches many things to them [FNS participants], like how to plant trees, making hajol and so on. We didn't come every day during the sessions because we didn't have time, but frequently we did go and we learned various things..... We [also] learned many things from [FNS participants] because our houses are adjacent and they practice whatever they learned from the brother.*

—Alipur, Bakhra, Jhikargaccha, Jessore<sup>2</sup>

*We heard that one or two persons near our house went to a school (FNS) and got training with lots of useful information. We became curious after hearing that and one day we also went and stood beside the training session to hear the useful information.*

—Chakhar, Ashrail, Banaripara, Barisal

For others, a neighbor or relative (FNS participant) actively shared their new knowledge with the non-FNS participant:

*We heard about that (FNS) from (an FNS participant) who attended the meeting (FNS). She got training and knows lots of useful information. Most of us know about FNS from her.*

– East Arsulia, Chakhar, Banaripara, Barisal

---

<sup>2</sup> No identifying information was obtained from the FGD participants. The attribution at the end of each quote denotes Village, Union, Sub-district (“upazila”), District

*My daughter-in-law (an FNS participant) came [to my house] one day and informed me that if I plant 8–10 seeds one at a time, they will mostly die. But, if I plant 2–3 seeds together in a pit and mix dry cow dung with it, then plants will grow well and I can get more gourds from that plant. I followed that and really benefited. I got 15–20 gourds this season.*

—Char Mansha, Razapur, Bhola Sadar, Bhola

Thus, non-FNS participants learned the improved practices both from SPRING staff and from FNS participants (their neighbors and relatives).

## Horticulture

Out of a total of 157 non-FNS participants in 16 FGDs, a show of hands found 85 percent (n=134) had adopted FNS techniques for horticulture (see Spillover Changes in Horticulture Practices below). According to the participants, women and mothers-in-law do most of the work in the gardens, although husbands and children help. Husbands and fathers-in-law tend to help with the heavy work and bring inputs from the market. Children also help in the garden with various tasks, such as sowing seeds or pulling weeds.

### Horticulture: Changes in Practices

Home gardening is a common practice in Bangladesh and almost all participants across the FGDs had engaged in some level of production prior to the arrival of farmer nutrition schools in their communities. In eleven of the FGDs, all non-FNS participants had gardens, while in five of the FGDs, the women did not have gardens (see Barriers and Challenges). The 15 percent of FGD participants (n=23; recorded by a show of hands) who were not practicing improved horticulture techniques did not have gardens. All participants with a garden were practicing new techniques taught by FNS. The following categories of change emerged from the data analysis, encompassing more detailed specific changes in practice: bed garden, pit garden, integrated pest management (IPM), seeds and seedling management, water management, and year-round production (Table 2).

Although home gardens are common in Bangladesh, there are usually a small number of plant varieties, and the gardens are not productive year-round. The new horticulture practices support increased gardening.

*Previously, we didn't do homestead gardening as much as we do now.*

—Char Mansha, Razapur, Bhola Sadar, Bhola

*Yes, we all had gardens, but not like now. Before, we sowed seeds haphazardly after a little digging in the soil, not following the pit or bed techniques. As a result, we didn't get a lot of crops and used chemical fertilizer and market pesticides.*

—Pukuriyavita, Darajhat, Bagherpara, Jessore

**Table 2. Categories of spillover changes to horticulture production**

Change	Previous Practices	Practices Adopted from FNS <sup>3</sup>
Bed Garden	<ul style="list-style-type: none"> <li>• Shallow spading and no mixing of soil</li> <li>• No beds, all planting on flat ground</li> <li>• Seeds scattered at shallow depth or on surface</li> <li>• All varieties planted together</li> <li>• No use of compost</li> <li>• Use of chemical fertilizers</li> <li>• No composting</li> <li>• Not using manure in the soil</li> </ul>	<ul style="list-style-type: none"> <li>• Making raised rows with trenches for water flow</li> <li>• Spacing seeds</li> <li>• Making separate rows for separate plants</li> <li>• Digging up to one meter deep and mixing the upper and lower layers of the soil with cow dung or compost</li> <li>• Mixing organic fertilizer (cow dung and/or compost) in the soil, up to one meter deep</li> <li>• Making own compost at home</li> <li>• Using manure</li> <li>• Not using artificial/inorganic fertilizers at all or as much</li> </ul>
Pit Garden	<ul style="list-style-type: none"> <li>• Shallow spading or shallow hole and no mixing of soil</li> <li>• 7–8 seeds planted together at shallow depth</li> <li>• Let plants grow where they sprout</li> <li>• No use of compost</li> <li>• Use of chemical fertilizers</li> <li>• No using manure in the soil</li> <li>• No garden because of space</li> <li>• Limited varieties because of space</li> </ul>	<ul style="list-style-type: none"> <li>• Making a one-hand deep hole (18 inches), mixing upper and bottom layer of soil then mix with organic fertilizer</li> <li>• Fewer seeds: 3–4 in one pit</li> <li>• After seedlings appear, separate and put in different pits</li> <li>• Making own compost at home</li> <li>• Mixing organic fertilizer (cow dung and/or compost) in the soil, up to one meter deep</li> <li>• Using manure</li> <li>• Gardening in a small space</li> <li>• Producing more varieties in a small space</li> </ul>
Integrated Pest Management	<ul style="list-style-type: none"> <li>• Use of chemical pesticides</li> <li>• Loss of plants because lack of knowledge on how to deal with pests</li> </ul>	<ul style="list-style-type: none"> <li>• Spraying water with kerosene, ash, detergent, neem leaves or mahogany fruit or leaves</li> <li>• Not using artificial pesticide at all or as much</li> <li>• More knowledge on how to deal with pests</li> </ul>
Seeds and Seedling Management	<ul style="list-style-type: none"> <li>• Plant seeds at shallow depth or scattered on top and no mixing of soil</li> <li>• Planting many seeds together</li> </ul>	<ul style="list-style-type: none"> <li>• Sowing seeds by mixing with cow dung and putting in the ground instead of spreading across the top of the soil</li> <li>• Putting fewer seeds in one hole/area</li> </ul>

<sup>3</sup> “One hand” equals 18 inches

Change	Previous Practices	Practices Adopted from FNS <sup>3</sup>
	<ul style="list-style-type: none"> <li>No knowledge of how to recognize quality seeds</li> <li>Storing seeds in a cloth</li> <li>Leaving plants where they sprout</li> </ul>	<ul style="list-style-type: none"> <li>Spacing seeds when planting</li> <li>Identifying quality seeds</li> <li>Wetting the seeds before sowing</li> <li>Storing seeds in a bottle</li> <li>Separating seedlings when seeds have sprouted</li> </ul>
Water Management	<ul style="list-style-type: none"> <li>Planting on flat ground</li> <li>Planting in low-lying areas</li> </ul>	<ul style="list-style-type: none"> <li>Making rows in the bed system with paths/trenches for water runoff</li> <li>Planting in raised beds</li> <li>Planting on higher ground to prevent loss due to water damage</li> </ul>
Year Round Production	<ul style="list-style-type: none"> <li>Planting one season with fewer varieties</li> <li>Planting in low-lying areas and away from the home</li> </ul>	<ul style="list-style-type: none"> <li>Planting different varieties according to the season</li> <li>Keeping the garden near the home and above ground to maintain production during the rainy season</li> </ul>

## Bed Gardening and Pit Gardening

According to the non-FNS participants, the bed and pit planting systems taught in the FNS are not traditional techniques. Traditionally, farmers would spade the surface of the ground and scatter seeds or dig a shallow pit and add many seeds at once. In bed gardening, raised beds are formed just wide enough for someone to reach into the middle, with paths in between the beds to facilitate access (Photo 1). Pit gardens are made by digging holes approximately 18 inches x 18 inches x 18 inches. In both bed and pit gardens, the top and bottom layers of soil are mixed, and fertilizer, compost, and/or manure are added (Photo 2).





Photo 1. Bed garden at a SPRING FNS participant homestead.

SPRING monitoring of the previous six months of individual FNS participant households in the same communities where the FGDs took place found that 79 percent of FNS participants had adopted bed gardening.<sup>4</sup> Similarly, in 13 of the 16 FGDs (or 81 percent), bed gardening was discussed as a change that some of the participants had adopted. In the FGDs, the non-FNS participants described some of the specific practices they are now doing, and the practices are identical or similar to what is taught in the FNS, as illustrated by the quotes below.

*Now we dig the soil to one meter deep and mix with cow dung, then we sow seeds in the soil. We get better results [this way]*

—Kismat Mahmudpara, Bashuari, Bagherpara, Jessore

*I saw my sister-in-law [FNS] gardening and I have followed that [method] this time, and my pumpkin production has a huge amount. We got 14–15 pumpkins. Now, we dig the soil to one meter deep, then mix with cow dung, then sow the seeds in the soil and get better results.*

—Pukuriyavita, Darajhat, Bagherpara, Jessore

*Planting saplings altogether made the saplings thin and die in a few days, but in the bed system, that doesn't happen because different seeds are sown in different rows, so nothing gets spoiled. Some seeds take some time to grow and some grow very fast, so to sow seeds in different rows is good for plants.*

—Kholshi, Dumuria Sadar, Dumuria, Khulna

---

<sup>4</sup> 2015 program data from SPRING.



Photo 2. SPRING FNS making a pit garden in a small space.

SPRING monitoring data found 67 percent of individual FNS participant households use pit gardens.<sup>5</sup> In 11 of the 16 FGDs, participants said they had tried using pit gardens. SPRING teaches pit gardening because it allows for gardening where there is limited space. Because the pits are only 18 inches in diameter, they can be placed in various locations around the homestead without utilizing one contiguous piece of land.

*For pit gardens, we make a one-hand deep hole, mixing the upper and bottom layers of soil, then we mix it with organic fertilizer.*

—Kacchapia (Chandrima Abashan), Badarpur, Lalmohon, Bhola

Focus group participants also talked about how they have changed their approach to soil nutrients in both bed and pit gardens. Now, they are composting with kitchen and other household waste, creating a low-cost, homemade fertilizer.

*Giving organic fertilizer was an encouraging factor for us; now we use less inorganic fertilizer and we try to use organic fertilizer more. Now we have learned how to make organic fertilizer easily at home. We put kitchen waste and others in a hole and cover it with plastic so that rainwater can't enter it and can't destroy it. After it turns to organic fertilizer, we can use it easily in the garden. We don't need to spend extra money to buy fertilizer.*

—Ashurail, Chakhar, Banaripara, Barisal

---

<sup>5</sup> 2015 program data from SPRING.

## Integrated Pest Management

Integrated pest management (IPM) is a set of techniques used to control infestation of insects that can harm crops. FNS sessions provide information on the agronomic, mechanical, biological, and chemical controls that comprise an IPM approach. SPRING also teaches FNS participants to build fences around gardens to protect vegetables.

*Now we use boiled water of neem leaves, Wheel powder [a type of local detergent], kerosene, and ash in our home garden. We spray these on the plants and it works as a good pesticide. Previously, we weren't aware about the toxicities of using artificial pesticide in the garden. We learned all of this from FNS [participant].*

—Guptomunshi, Purbo Elisha, Bhola Sadar, Bhola

*Earlier, for preventing insects, we used market pesticides, but now we know that it's not good for our health, so now we make [organic] pesticides at home with ash, neem leaves and mahogany fruit. We boil the neem leaves and mix it with 1/2 liter water and spray it on the plants and do the same with mahogany leaves.*

—Kholshi, Dumuria Sadar, Dumuria, Khulna

## Seeds and Seedlings

During the focus group discussions, participants described how they had changed the way they plant and preserve seeds and how they manage seedlings, once sprouted or when planted. As previously noted, traditionally the community spread seeds at random points across the ground or at a shallow-spaded depth, or by digging a shallow hole and putting in many seeds in the hole. The FGD participants described how they have now learned to put only a few seeds in one hole and to separate seedlings once they have sprouted.

*We never separated the seedlings after growing, so the plants did not grow well, and most of the time they died. But now that doesn't happen because now we sow 4 or 5 seeds together in a pit, and after growing the seedlings, we separate them into different pits.*

—Alipur, Bakhra, Jhikorgacha, Jessore

Before they learned to plant fewer seeds and separate seedlings, they experienced more plant loss.

*Now we sow the seeds by spading the soil one-hand [18 inches] deep and mixing it with cow dung. Before, we just spread the seeds and the seeds did not grow correctly, and most of the seeds spoiled. But now, we know the right process of sowing seeds.*

—Fulbaria, Dumuria Sadar, Dumuria, Khulna

*Before we cultivated plants in the same place, like red amaranth and Indian spinach in the same place, but now we follow the bed system, so we planted different vegetables in different places.*

—Dakhindihi, Damador, Phultala, Khulna

The non-FNS participants also discussed learning how to identify which seeds they should plant and which will not grow.

*Now we can also identify which seeds will grow well. We cover the seeds in water and those which are not floating.*

—East Arsulia, Chakhar, Banaripara, Barisal

The seed preservation techniques have also changed. Before the FNS came to their communities, people often stored seeds by wrapping in paper or cloth. Now, the focus group participants said, they have learned to use a plastic bottle with a tight lid to store seeds.

*We dry them [seeds] in sunlight and keep them safely in a white plastic boyam [bottle]. Before, we kept them covered with cloth and they usually got damaged or were eaten by insects.*

—East Arsulia, Chakhar, Banaripara, Barisal

Although SPRING distributed plastic bottles to FNS participants to promote seed preservation, the non-FNS participants have used their own resources to procure proper plastic storage bottles.

*For seed collection, we select matured fruits and vegetables and dry them in a tree. Then, we collect seeds which are big, fleshy and nice looking. After that, we dry them properly in the sunlight and keep the seeds in an airtight bottle. SPRING project staff gave a bottle to the beneficiaries, but they don't give us that bottle. We manage the same type of bottle from the market or from home.*

—Ashurail, Chakhar, Banaripara, Barisal

## **Water Management**

In the bed and pit planting methods, the planted area is raised above the ground level and rows and holes are used to divert water. Bangladesh is a watery country and the coastal area has rivers, estuaries, wetlands, seawater, and rain. Flooding from heavy rain and waterlogging is a frequent occurrence. During the focus group discussions, participants described losing their harvest to water damage and, sometimes, losing their entire garden permanently. The FNS taught them to look for areas to plant on higher ground, to build up their gardens with the raised beds and/or pits, and create places to divert water flow from the garden.

*To prevent waterlogging, we make a little hole beside the beds and pits, then the water doesn't make any problem.*

—Dakhindihi, Damador, Phultala, Khulna

*First, we prepare the land by spading, then we make four beds and, in between the beds, we keep some space for water to flow out. Due to this bed system, the water flows out easily, so our [plant] roots do not get damaged and, also, we can easily clean out the weeds.*

—Kacchapia (Dhumketuabashan), Badarpur, Lalmohon, Bhola

## **Year-Round Production**

The changes in horticulture have resulted in the knowledge and capacity to support year-round production. The non-FNS participants said they now know which seeds to plant at different times of the year to keep production going.

*In bed gardens, we cultivate different seeds, such as red amaranth, radish, spinach, long yard bean. Actually, we are now sowing seeds per season. Before, in our garden, we have only bean and bottle gourd plants.*

—Kacchapia (Dhumketuabashan), Badarpur, Lalmohon, Bhola

Additionally, year-round production is linked to establishing gardens on higher ground (i.e., water management) as the low-lying areas are inundated with water at certain periods of the year.

*In previous times, we usually made the garden in low land areas and it was usually destroyed with water, but now we try to make our homestead garden in high land and near our home. So, we can usually get shak [a generic term for dark leafy green leaves] and vegetables around the whole year.*

—Guptomunshi, Purbo Elisha, Bhola Sadar, Bhola

## Horticulture: Benefits from Improved Practices

Each focus group was asked what encouraged them to adopt FNS horticulture practices and how they benefited from the changes. All benefits they cited were not prompted by the FGD facilitators. Table 3 shows each benefit from horticulture noted by the non-FNS participants and the number of FGDs in which that benefit was mentioned. Most of the benefits noted by the non-FNS were the same benefits taught during the FNS by SPRING. Four benefits were mentioned in over half of the FGDs:

- Consumption of and access to greater quantities and varieties of fruits and vegetables
- Cost-savings from not having to buy produce at the market
- Not needing to wait for someone else to go to the market to buy produce
- Better health and nutrition.

Income generation, increased yield, and being able to cook when needed/wanting to were noted as benefits in approximately half of the FGDs.

**Table 3. Benefits from horticulture**

Access to a greater quantity and variety of fruits and vegetables	Better seed preservation
Money saved on produce	Toxin-free integrated pest management
No need to wait for someone to go to the market	Harvest loss reduction
Improved nutrition and health	Money saved on fertilizer
Income generated from vegetable sales	Better water flow through the garden
Increased yield	Money saved on pesticides
Can cook when wants/needs to	Meet family food needs
Year-round production	No need to wait for someone to bring pesticides
Toxin-free fertilizer	Increased number of varieties grown
Toxin-free vegetables	Money saved on healthcare
Have surplus to give family and neighbors	Easier access to garden for weeding

The benefits can be classified into three categories: (1) harvest loss reduction and increased yield, (2) income generation and cost and time savings, and (3) improved health and nutrition. Each of these categories was specifically mentioned in the FGDs, but other benefits also fall into these overarching categories.

## Harvest Loss Reduction and Increased Yield

Focus group participants cited harvest loss reduction and increased yield as an overall benefit of the FNS practices, but the women also talked about other practices that led to both reduction in loss and increase in production/yield, such as better seed preservation, better water flow through the garden, and easier access for weeding. They described how raised beds prevented loss to water damage, how immediate access to homemade pesticides reduced loss because the pest problem could be addressed quickly, and how fencing kept the animals and children from trampling the garden. Gardens saw higher yields as a result of mixing manure and organic fertilizers in the soil, and planting fewer seeds together and separating seedlings. The focus group participants noted that before they learned about and used the improved horticulture practices, fewer plants matured and were able to produce fruits.

*Yes, we have the experience of planting plants before, but we didn't make a garden with the bed system. Now we can water plants or pull up fruits or vegetables smoothly in bed system gardening. It is very helpful.*

—Ashrail, Chakhar, Banaripara, Barisal

*Previously, we put 7–8 seeds in one pit. Plants didn't grow well that way. Now, we put not more than one spoon, or 3–4 seeds, in one pit and plants grow very well.*

—Ashrail, Chakhar, Banaripara, Barisal

*Previously, we didn't garden in the bed system. The bed system makes it easy to give water or fertilizer in the garden and also to pull up vegetables. Previously, we didn't do this, but it's useful. The plants grow better now. The plants are not rotten from the water [saturation from standing water].*

—Guptomunshi, Purbo Elisha, Bhola Sadar, Bhola

By increasing their yield, the new techniques have provided families with more fruits and vegetables to eat (“meet their needs” as the FGD participants described), and have even allowed them to share food with neighbors and relatives, earn income, and save money.

*Cultivating in this system [bed], now we get a lot of different types of vegetables from our garden and we can give it to neighbors and can also sell. Always cooking the same vegetables is not good to eat, so in bed techniques we can eat different types of vegetables. Besides that, the plants do not die in rainwater so we are benefited.*

—Shonkorpor, Shonkorpor, Jhikargaccha, Jessore

The above testimony illustrates several of the benefits discussed across the focus groups, including increased yield, reduced loss to water damage, more varieties in the garden, more varieties to eat, sharing with neighbors, and earning income. Earning income and cost savings are presented in the next section.



## Income Generation and Cost and Time Savings

The focus group participants were asked if they were able to generate income from their gardens. They noted that those who were producing more in their gardens, usually with the bed system, were able to sell surplus produce and earn money.

*We didn't get much fruits or vegetables to sell before, but now we get big pumpkins which weigh 10–15 kg. We eat those and sell those. We earn 500–2000 taka (approximately \$6–\$25) by selling vegetables. Moreover, we can earn some money by selling other vegetables to our neighbors. White gourd, bean, pumpkin, papaya, Indian spinach grow very well in the homestead garden and we can sell these vegetables after meeting our family's needs.*

—Guptomunshi, Purbo Elisha, Bhola Sadar, Bhola

Those who had earned money said they spent the money on children's education, transportation to school, and also to help their husbands with rice production.

*Mostly, we spend this money for children's education purposes, like buying paper, pencils or for snacks. Sometimes, their father is not present in the home [away from home for work] and during that time, the children don't want to go school. They try to stay home and play. If we give them rickshaw fare or snack money, they feel good and happy to go to school. We manage this extra cost from our homestead garden.*

—Ashurail, Chakhar, Banaripara, Barisal

*It is not easy to buy vegetables every day for a family because it's very costly. Now we can produce [our own], so we don't have to buy, but we can save our money and can invest in other household needs, like for the education expenses of our children or for ours [needs] and sometimes we help our husband also.*

—Kholshi, Dumuria Sadar, Dumuria, Khulna

*Sometimes we can help our husband to hire more labor in the field [in harvesting time] with this money.*

—Ashurail, Chakhar, Banaripara, Barisal

When asked about income generation, the women noted that they had been able to save money by not having to buy produce.

*Yes, more or less we all have increased our income by selling and those of us with less space, we can't sell always, but we can fulfil our consumption, so this really decreases our cost in the future.*

—Damudor Hajrapara, Damudor, Phultala, Khulna

*Now we do not need to go far away for vegetables and do not need to buy vegetables from market. We can easily get it whenever we need.*

—Ashurail, Chakhar, Banaripara, Barisal

Immediate access to fruits and vegetables and time savings were also associated with home gardens because there is less need to go to the market.

*The most useful thing is, if we need vegetables while we are cooking, like in an emergency, like if we put too much salt or turmeric in the curry, then we can bring more vegetables from our own homestead garden and minimize [the salt or turmeric]. Also, if we need a green chili during cooking or eating, we can manage a fresh one easily from our*

*garden. Previously, we couldn't do that. This encourages us more. Now we do not need to go far away for vegetables and do not need to buy vegetables from the market. We can easily get it whenever we need. This encourages us more.*

— Ashurail, Chakhar, Banaripara, Barisal

In addition to saving money from not buying produce, cost savings was said to be a result of not having to buy fertilizers and pesticides, as well as not needing to go to the doctor as often due to better health:

*The chance of disease is now decreased, so our medical costs have also reduced.*

— Kacchapia, Dhumketuabashan, Badarpur, Lalmohon, Bhola

## **Improved Health and Nutrition**

In several focus groups, women cited improved health and nutrition as a benefit of the new practices. This benefit is, in part, tied to decreased use and consumption of chemicals through organic horticulture practices, such as chemical-free fertilizers and pesticides.

*My husband cultivates vegetables commercially next to the pond, so he uses the market pesticides, but at home where I cultivate vegetables, I don't use that, only organic fertilizer. My husband also said to do that because we and our child eat those vegetables, so if we use the market pesticides, then our children will not get vitamins and nutrition, and they are harmed.*

—Kholshi, Dumuria Sadar, Dumuria, Khulna

*We don't use inorganic fertilizer, so it is more nutritious. But, earlier, we used that [chemical fertilizers] and the market vegetables also have inorganic fertilizer. Now we use cow manure. It is good for vegetables and, also, for our health as we get more nutrition. So, our children are disease free. They think that now people are attacked by various diseases because of using inorganic fertilizers and pesticides.*

—Imamgathi, Rangasree, Bakerganj, Barisal

Additionally, improved health and nutrition is attributed to consumption of fresh, diverse foods year-round and, therefore, consumption of multiple vitamins.

*We can eat vegetables daily, which is good for health because they contain a lot of vitamins. We didn't understand this well before, but now we know it very well, so we try to keep vegetables in every meal.*

—Shonkorpor, Shonkorpor, Jhikargaccha, Jessore.

*We can eat fresh vegetables of our own and we get vitamins also.*

—Alipur, Jakhra, Jhikargaccha, Jessore.

*Before, we didn't eat different types of vegetables like gourd, Indian spinach, and pumpkin the whole year round.*

—Char Mansha, Razapur, Bhola Sadar, Bhola

## **Horticulture: Barriers and Challenges**

Through a show of hands at the beginning of the horticulture section of the FGD, participants were asked how many of them garden. Only five FGDs had any participants who did not garden. The reasons for not gardening



included limited available space, water damage, animals that destroy the garden, lack of sunlight, lack of family support, and limited technical knowledge and skills. These barriers and challenges are discussed below.

## Limited Space for Gardening

During the FGDs, some of women cited their limited space as a reason for not gardening.

*We have little space to make any garden here....That's why some of us can't make a home garden, though we would like to do it.*

— Guptomunshi, Purbo Elisha, Bhola Sadar, Bhola

SPRING required that participants have a minimum amount of land available to them, ideally 1–2 decimals. This minimum amount of space and the time they were willing to invest were the only requirements to participate in an FNS. By contrast, the non-FNS FGD participants did not have to meet a minimum landholding requirement to participate in the FGD; therefore, some of the FGD participants did not have sufficient space to garden. Some of the non-FNS participants have used the pit gardening technique taught during the FNS as a way to optimize small spaces. The facilitators for the FGD in Kacchapia (Chandrima Abashan), Badarpur, Lalmohon, Bhola noted that all FGD participants in Chandrima Abashan have a garden, but most are practicing pit gardening because of the limited space around their homes.

*Now we can get different types of vegetables in a small place. This concept helped us so much. Previously, we didn't think about this and our yard was unused and not useful.*

— East Arsulia, Chakhar, Banaripara, Barisal

Although some participants said they did not get as high a yield from pit gardening as from bed gardening and, thus, may not have enough surplus to sell, they agreed that the pit gardening technique had been effective in both providing access to diverse vegetables and saving money by reducing market purchases. Non-FNS participants using the pit gardening techniques appreciated the ability to yield crops from small spaces.

*Now we get different types of vegetables together, which is very good for us. Now, we can eat different types of vegetables and can cultivate them in a small space.*

— Fulbaria, Dumuria Sadar, Dumuria, Khulna

## Water Damage

In Ashurail, Chakhar, Banaripara, Barisal, some of the FGD participants were not gardening because they said their homes were in low-lying areas and the waterlogging (when the ground is saturated with water) presented a problem. The rainy season brings heavy rains that sometimes destroy the garden. Many of the SPRING target villages are in a low-lying coastal area that experiences tidal surges with storms, bringing saline water into the gardens, or the area becomes inundated with water during the rainy season. For some households, the water from rains and tidal surges remains in place for weeks or months.

*The rainy season makes some hazards for the homestead garden. Extra rain and tidal water causes waterlogging in the low land area and destroys our garden. [Damage from] Rainwater sometimes can be prevented by covering [the garden with] plastic, but the tidal water, when it is a hazard, we can't overcome it.*

— Ashurail, Chakhar, Banaripara, Barisal

*Yes, sometimes we face difficulties, like in the rainy season our plants die due to heavy rainfall and there is nothing we can do. What can we do in this situation? And all the people have to face this. However, after the rainy season, we again cultivate seeds.*

— Alipur, Bakhra, Jhikorgacha, Jessore

## **Animals Destroying the Garden**

Animals can also be a problem, but this challenge can be resolved, as one woman attested:

*We don't have enough space to cultivate vegetables in a bed and here almost all people rear goats, so despite having a fence, the goats destroyed the garden; and for that a lot of quarreling also happened, so now we do only pit cultivation where we can cultivate creeping crops.*

—Shonkorpur, Shonkorpur, Jhikargaccha, Jessore

FNS teaches participants to put sticks in the pits to trellis the vegetables. The pit gardening, taught in the FNS, appears to resolve the goat threat while also providing a solution to limited space.

## **Lack of Sunlight**

In addition to limited space, some of the women described how the available space they have for gardening does not get adequate sunlight due to surrounding trees; thus, they cannot grow a garden there.

*As there are so many raintrees and wooden trees in our area, some of us can't have a homestead garden because of the shade from the big trees. Plants can't grow well there and don't get enough sunlight.*

—Guptomunshi, Purbo Elisha, Bhola Sadar, Bhola

## **Lack of Family Support**

For a few women in the focus groups, gardening was not an option because their husbands migrated for work and they could not find time to garden in addition to handling all the other household work and affairs on their own.

*Furthermore, some of us don't have family members like a son, daughter or even a husband in the home [sons, husbands work in town or abroad]. We are alone and do all of the work for the family in the home. So, we can't manage time to do [a garden].*

— Guptomunshi , Purbo Elisha, Bhola Sadar district-Bhola

## **Limited Technical Knowledge and Support**

When asked what challenges they had faced when attempting to practice FNS techniques, some women described not having sufficient technical knowledge or inputs because of lack of access to advisory services and other resources provided by the project.

*We didn't know the exact amounts for mixing detergent and water or ash and water. Sometimes we used more detergent and afterward, spread it by hand and our papaya or other vegetables were getting damaged. Later, we learned we have to spray it with date leaves or coconut leaves, so the detergent does not stay on the peel of the fruits and can't make spots on it.*

—Ashurail, Chakhar, Banaripara, Barisal

*Another thing is, as we are not beneficiaries of SPRING, we don't get seeds on time [to plant for the season]. We get seeds from the market and some of us are late to collect seeds on time. It is a challenge to make the garden and plant seeds in time or in season. We face loss [of harvest] for it.*

—Ashurail, Chakhar, Banaripara, Barisal

## Poultry Rearing

Most of the non-FNS participants said they are or have been engaged in poultry rearing techniques taught by the FNS. According to SPRING monitoring data from the same 15 villages, 78 percent of FNS households were practicing improved poultry techniques at the time of data collection.

*We did poultry rearing before, but did not maintain as much quality as we do now.*

—Ashurail, Chakhar, Banaripara, Barisal

The non-FNS participants said that women, adolescent girls, and mothers-in-law do most of the work with the poultry, such as cleaning the shed, caring for and feeding the chickens, overseeing hatching, and making brooding nests. As with horticulture, the SPRING FNS encourages all family members to contribute and participate in food production, so as to ease the burden on women's time. In the FGDs, participants were asked if they received support for their poultry production activities.

*Yes, we get support from our family members such as sometimes our mother-in-law gives food to chickens. When we are absent from home, then our elder daughters and sons also take care of the chickens.*

—Kismat Mahmudpur, Bashuari, Bagherpara, Jessore.

Some women said that men help by bringing vaccines, medicines, and poultry feed from the market and the Department of Livestock Services office.<sup>6</sup>

*Our poultry sometimes get sick. When they get sick, we feed them [an antibiotic] tablet. On behalf of our community, one man brings vaccines from town and vaccinates our poultry for two taka per hen, after a 15–20 day interval. For chickens, we put drops in their eyes and under their arms.*

—Kaccapia, Badarpur, Lalmohon, Bhola

They also said that men help by taking the surplus chickens and eggs to the market to sell and by building the poultry shed and fence. Children help by collecting eggs and feeding the chickens. Everyone in the family helps with caring for the poultry if the woman is away.

## Poultry Rearing: Changes in Practices

Like home gardening, rearing poultry is a common practice in Bangladesh. Most non-FNS participants have engaged in some sort of poultry rearing in the past.

---

<sup>6</sup> SPRING FNS teaches women to acquire vaccines from representatives from the Department of Livestock Services (DLS) and SPRING also capacitates local community members to buy the vaccine in bulk from DLS and provide the vaccination services for a small fee to poultry producers in their communities. SPRING does not promote the practice of buying vaccines from an input retailer at the market; however, this practice is not uncommon in rural areas.

We all have experience in poultry rearing. Earlier we used the traditional brooding nest [they called it "Bangla Hajol"] and put all the eggs for hatching [under the chicken], so all eggs did not hatch; and we didn't know about creep feeding.

—Imamgathi, Rangasree, Bakerganj, Barisal

Table 3 shows the previous practices and the changes that have been made in accordance with FNS teachings. Among the 12 adopted poultry practices discussed in the FGDs, two changes were mentioned in over half of the FGDs:

- using the improved hajol (brooding nest) as taught by FNS or using a similar, modified version of the traditional hajol
- separation of chicks from the mother several weeks after hatching

**Table 4. Categories of spillover changes in poultry production**

Change	Previous Practices	Practices Adopted from FNS
Brooding and Hatching	<ul style="list-style-type: none"> <li>• Traditional brooding nest (no place for food and water) or free-roaming nesting</li> <li>• No checking of eggs for fertility</li> <li>• Too many eggs under the hen in the brooding nest</li> </ul>	<ul style="list-style-type: none"> <li>• Improved brooding nest with places for food and water</li> <li>• Checking eggs for fertility to see which will hatch and which to eat</li> <li>• Putting fewer eggs under the hen in the brooding nest</li> </ul>
Care of Young Chicks	<ul style="list-style-type: none"> <li>• No separation of chicks from hens</li> <li>• No supplemental feeding of chicks</li> </ul>	<ul style="list-style-type: none"> <li>• Separating chicks after specified number of days</li> <li>• Creep feeding</li> <li>• Buying formulated feed and/or feeding chickens something other than rice<sup>7</sup></li> </ul>
Chicken Feed	<ul style="list-style-type: none"> <li>• Chickens fed rice and what they scavenge</li> </ul>	<ul style="list-style-type: none"> <li>• Chickens fed broiler feed, fish meal, corn, egg shells, snail shells, and other sources of food</li> </ul>
Health Management	<ul style="list-style-type: none"> <li>• Limited or no use of vaccinations</li> <li>• No use of hygienic bedding in the brooding nest</li> <li>• Not attentive to chickens' behavior</li> <li>• Infrequent cleaning of the poultry shed</li> <li>• Sheds on the ground</li> <li>• Diseased chickens not removed</li> </ul>	<ul style="list-style-type: none"> <li>• Vaccination</li> <li>• Using neem leaves, ash, or lime in bedding of brooding nest to prevent disease and insects</li> <li>• Observing the chickens' behavior to determine needs</li> <li>• Cleaning the poultry shed</li> <li>• Making space for ventilation under the shed</li> <li>• Separating diseased chickens from the others</li> </ul>

<sup>7</sup> SPRING FNS teaches to feed a small amount of feed to the chicks when they are first separated from the mother.

## Brooding and Hatching

The FNS teach women to make and use an improved brooding nest that has attached bowls for food and water, unlike the traditional nest, which does not provide access to food and water. Participants observed that having the food and water attached to the nest allowed the hen to consume more food, while reducing heat loss during incubation because she no longer needed to leave the eggs to find food. Thus, the success rate for hatching increased. With steady access to food throughout the incubation period, the hen does not lose weight and is ready to start laying more eggs in a shorter time period, resulting in increased production throughout the year.

*The FNS graduate made a brooding nest with clay and in the front she made two sections for water and feed for the hens. Now, we also followed her and, by doing this, now our hens don't go outside during the incubation period. So, eggs get warmer and almost all the eggs hatch. During incubation, as the hens can eat, so the eggs will be produced again in her sac.*

—Kacchapia (Dhumketuabashan), Badarpur, Lalmohon, Bhola

*Previously, we didn't watch our chickens like we do now. We feel that when the chicken goes to the brooding nest, it needs to take more water and food like our lactating mothers. Previously, they [chickens] go here and there and we didn't watch them. Now, the chicken also doesn't lose their weight so much. Before, they lost half of their weight during the hatching period.*

—Char Mansha, Razapur, Bhola Sadar, Bhola

The women also described how they have learned to check an egg to see if it is fertile or not, thus determining whether to place it under the broody hen or eat it. If it is fertile, it has a black spot visible when a light is shone on it.

*We get all the chicks because we check the eggs in the lamp light and we can tell which [eggs] are good or not because good eggs have a black spot inside, but not bad ones, and those we eat ourselves.*

—Kholshi, Dumuria Sadar, Dumuria, Khulna

Some women accurately (according to FNS teachings) recounted that the amount of eggs to go under the broody hen for incubation should equal no more than half the weight of the hen.

*Sometimes, the [FNS] meeting also happens near our home. We saw they (SPRING staff) first take the chicken's weight, then let them sit in brooding nest and put in that amount of eggs which is equal to half of chicken's weight. They say it will help to hatch the chicks properly. I followed that technique and was benefited.*

—Ashurail, Chakhar, Banaripara, Barisal

## Care of Young Chicks

FNS participants learn to keep newly hatched chicks with the hen to maintain needed heat levels for the first few days/weeks (depending on season) of life and then put the chicks into a separate enclosure that protects them from predators and cold. FNS also teaches creep feeding, which is the gradual introduction of increasing amounts of formulated feed over time to encourage growth. During the focus group discussions, the women said they had adopted the practices of separating chicks and creep feeding, but they provided inconsistent responses on how many weeks the chicks should stay with the hens before separation.

*Previously, we did not separate the hen and chicks. Now we separate within 14 days in the winter and within 7 days in the summer. We thought the chick would not live without the mother, but it seems wrong now. If we take proper care and give poultry feed regularly to them [chicks], they will grow well.*

—Guptomunshi, Purbo Elisha, Bhola Sadar, Bhola

## **Chicken Feed**

The type of food being fed to chickens has changed, as well, with commercial, or “boiler,” food being fed during creep feeding for chicks and other types of feed being given to adult chickens. Traditionally, rice is given to supplement scavenging. In line with FNS practices, FGD participants in all areas said now they are giving other foods to the chickens, such as fish meal, corn, and egg shells.

*Now, we also made a change in feeding of hens. Earlier, we threw away egg shells, but now we store them in a bag, dry them in sunlight, then crush and mix with snail shells for feeding our poultry.*

—Imamgathi, Rangasree, Bakerganj, Barisal

## **Health Management**

During the focus group discussions, the women reported having changed the way they manage the health and nutrition of their birds. When they notice diseased birds, they separate them from the flock. They also described how they now vaccinate their chickens regularly.

*But now, we all are vaccinating the chickens and separating chickens during disease, like if one chicken is suffering for any disease, then we separate it from other chickens. As a result, all chickens do not die at one time.*

—Kismat Mahmudpara, Bashuari, Bagherpara, Jessore

*Now we vaccinate our chickens after three months. One of our neighbors brings vaccines from the Bakerganj livestock hospital. A 25 taka vial of vaccine can vaccinate 100 hens.*

—Imamgathi, Rangasree, Bakerganj, Barisal

The women also said have learned more about disease prevention from FNS participants or SPRING staff. For example, they use neem leaves, ash, or lime in the bedding of the brooding nest to prevent lice, other insects, and disease. They also make a space underneath for ventilation and to help keep the poultry shed clean.

## **Poultry Rearing: Benefits from Improved Practices**

Each FGD was asked to discuss what encouraged them to adopt FNS poultry practices and how they have benefited from these changes. Table 5 shows each benefit of poultry rearing discussed by the non-FNS participants.

Table 5. Benefits of poultry-rearing

Increased production	Can eat eggs or chicken when need
Eat more eggs in household	Don't have to go to market to buy
Earn income from selling chickens and eggs	Save money by not buying at the market
Eat more chicken in household	Eat more native chicken <sup>9</sup>
Have meat/eggs to serve visitors	Disease reduction
Children have more eggs to eat	Smell reduction
Meet family requirements for food/nutrition	

The benefits noted by the FGD participants can be placed in three categories: (1) increased production, (2) increased consumption and better nutrition, and (3) income generation and cost and time savings.

### Increased Production

Increased production was both a benefit of FNS practices and a cause of increased consumption and better nutrition, which are discussed in the following two sections. Non-FNS participants credited the techniques they learned from FNS participants or SPRING staff with bringing them more hatched eggs and more chickens, more eggs to eat, and more eggs and chicken to sell.

*Now we benefit in two ways: We get more eggs than before and we get more chicken to eat and to sell. That encourages us most.*

—Char Mansha, Razapur, Bhola Sadar, Bhola

*Now we hatch 12–14 eggs under a big hen and 8–10 eggs under a small hen. So, the eggs hatch out properly and we get more.*

—Guptomunshi, Purbo Elisha, Bhola Sadar, Bhola

*Earlier, we put all the eggs [with the chicken] for incubation and didn't eat any. We thought that if we gave more eggs [for incubation], then we would get more chickens and when they get older we could eat and also sell them. But, most of the time, only half of the eggs were hatching. Due to use of the improved brooding nest and creep feeding, now we get more production.*

—Kacchapia (Dhumketuabashan), Badarpur, Lalmohon, Bhola

Increased production also means having more chickens and eggs to share with guests and neighbors, a benefit also discussed by the non-FNS participants.

<sup>9</sup> 2015 program data for SPRING.

*When any guest visits our house, we cook eggs and hens.*

—Imamgathi, Rangasree, Bakerganj, Barisal

## **Increased Consumption and Improved Health and Nutrition**

Being able to eat more eggs at home and feed more eggs to their children was a benefit highlighted in almost all FGDs. The farmer nutrition schools promote consumption of eggs, especially among children.

*Now we are able to eat 10 or more eggs in a month and also can give eggs to the children to eat.*

—East Arsulia, Chakhar, Banaripara, Barisal

*Now we get more eggs and can consume and sell them, and we get vitamins and it [consuming eggs] helps to meet our protein demand.*

—Shonkorpor, Shonkorpor, Jhikargaccha, Jessore

The focus group participants articulated a link between egg consumption and health, something promoted by SPRING FNS, and gave it as a reason to practice poultry rearing.

*We can eat eggs and it's good for health, so we rear poultry.*

—Kholshi, Dumuria Sadar, Dumuria, Khulna

Focus group participants said they were able to eat more chicken as a result of increased production brought about by improved poultry rearing practices. Furthermore, they distinguished between broiler chickens and native chickens, explaining that eating and being able to serve native chicken to guests was a benefit.

*We hear that native chicken meat has more vitamins and helps us to reduce cancer, so we try to eat more native chicken and their eggs rather than broiler chickens. Now we produce more native chickens in our own home and can eat them more. This encourages us.*

—East Arsulia, Chakhar, Banaripara, Barisal

## **Income Generation and Cost and Time Savings**

In every FGD, participants commented that poultry production reduced household expenditures by lessening or eliminating the need to purchase eggs or meat and/or because chickens and eggs could be sold for income. Not all individuals who rear poultry said they are able to make an income, but those who were able to reported making anywhere from 800 to 6000 taka per month (\$10–\$77). That money is spent on children's educational needs, additional inputs, other household needs (e.g., snacks, feminine products, clothes), and contributing to overall household expenses.

*It saves our husband's money and sometimes we sell hens to buy clothes for ourselves or maybe books, pencils, or snacks for our children.*

—Damadar Hazrapara, Damador, Phultala, Khulna

In East Arsulia, Chakhar, Banaripara, Barisal, the group discussed how the money they earn from selling chickens and eggs can help cover additional household expenses, such as being able to hire labor during cultivation and harvest of their husband's cash crops. Also, some women said that having the money from poultry rearing helped the family get through times when their husband cannot find work. Earning money through rearing poultry helps



women contribute to the family income and this reportedly encourages the entire family to support poultry production.

*My family members support me a lot because everyone consumes eggs, so it's very much profitable for the house and they support me a lot.*

—Shonkorpor, Shonkorpor, Jhikargaccha, Jessore

Women also talked about using local savings mechanisms to save money for times of crisis.

*We also save this money [earned from poultry rearing] in some NGO savings committees which exist in our local area. In crisis times, this supports us a lot.*

—Ashurail, Chakhar, Banaripara, Barisal

Savings can also be used to purchase large assets as an investment.

*I bought land by selling some hens and now I am buying cows by selling my land.*

—Imamgathi, Rangasree, Bakerganj, Barisal

## Poultry Rearing: Barriers and Challenges

Barriers or challenges that were discussed in the FGDs include lack of access to and cost of vaccines, medicines, and treatment services, lack of technical knowledge on disease identification and treatment, and cost of inputs for poultry rearing (other than healthcare).

Overall, issues associated with managing health and disease dominated the conversations about barriers and challenges in the FGDs. Some of the non-FNS who have engaged in poultry production talked about how they were not doing it regularly or had stopped because of loss due to disease. In contrast, the FNS participants, who receive regular support from SPRING staff, even when they have graduated from the FNS, continue to engage in poultry rearing, with monitoring data showing 78 percent of FNS participants (including graduates from all years) practicing FNS techniques for poultry rearing.<sup>9</sup>

### Lack of Access to and Cost of Vaccines, Medicines, and Treatment Services

The cost of the transportation to procure vaccines and the cost of the vaccines themselves were cited as barriers or challenges. The women noted that if no one brought vaccines to their villages, they had no way to access them. If they have to wait for their husbands to get a vaccine or medicine for the chickens, they would sometimes not get it in time and the chicken would die.

*We need to buy that [medicine]. Every time [a chicken is sick], someone needs to go to town to buy this.*

—Char Mansha, Razapur, Bhola Sadar, Bhola

*When our poultry shows symptoms, we feed them one medicine from the local market. Sometimes it works or sometimes it does not. The livestock hospital is far away from here and it takes 40 taka (\$0.50) for transportation.*

---

<sup>9</sup> 2015 program data for SPRING.

*Most of the times our husbands are not at home, so who will go to bring that medicine from the hospital?<sup>10</sup> And, also, I might have three hens [that need treatment] and it takes 40 taka for transportation and the medicine cost is 15–20 taka (\$0.19–\$0.25), so it is costly for us. Nobody comes to our house for vaccination.*

—Kacchapia (Chandrima Abashan), Badarpur, Lalmohon, Bhola

*Still we face the problem of proper vaccination on time. We mostly do not manage the vaccine in proper time. We can't manage people to go to town and collect the vaccination in time. That's still a problem for us. If you can make any solution on that point, it will be helpful for us.*

—Ashurail, Chakhar, Banaripara, Barisal

## **Lack of Technical Knowledge on Disease Identification and Treatment**

Another major challenge that was articulated is that people do not have sufficient knowledge about the different poultry diseases and how to recognize, prevent, and treat them.

*Yes, most of the times our hens died due to diseases, but we don't know what the names [of the diseases] are. The hens show some symptoms like runny eyes, loss of appetite, loose bowels, and sometimes fever. When our poultry show those types of symptoms we feed them one medicine from the local market. Sometimes it works or sometimes not.*

—Kacchapia (Chandrima Abashan), Badarpur, Lalmohon, Bhola

*We mostly give Renamycine tablet (yellow color), deworming tablet and vitamin tablet to the chicken; but sometimes that does not work well. We don't know what medicine we will need to give for a particular disease.*

—Char Mansha, Razapur, Bhola Sadar, Bhola

The women observed that FNS participants did not experience the same problems they did, so some of them have asked for SPRING staff or FNS participants to teach them what to do.

*After talking with the FNS nutrition volunteer and other neighbors, we vaccinated our chickens, but they still died because we don't know all the vaccines for chickens and we gave just one vaccine or there was just one chicken who contracted the disease. That's why maybe still now we face these difficulties.*

—Dakhindihi, Dumador, Phultala, Khulna

*We are not quietly overcome, so we will talk over this matter with SPRING members because those who are the FNS graduates, their chickens aren't suffering diseases or dying like ours.*

—Damudor Hajrapara, Damudor, Phultala, Khulna

---

<sup>10</sup> Many women in Bangladesh have limited mobility and are not permitted to leave their homes without a male escort. They usually rely on their husbands to purchase or bring things from outside the home.

## Cost of Inputs for Poultry Rearing

SPRING does not provide its FNS participants with financial or other assistance to build the improved poultry sheds, purchase chickens, buy feed, or do anything else related to poultry rearing. The non-FNS participants talked about these costs as a challenge, but also noted that the benefits were worth the investment.

*Now we feed broiler feed to chickens and ducks and that needs some cost. Though it doesn't matter because we benefited a lot.*

—Char Mansha, Razapur, Bhola Sadar, Bhola

*We have costs due to building our poultry sheds and we have to do more work now. But, we get more eggs and chicken, so it is not a difficulty for us.*

—East Arsulia, Chakhar, Banaripara, Barisal

## Aquaculture

Few of the non-FNS participants had an individual pond for fish farming, although some of their husbands were involved in a collective or multi-owner, pond,<sup>11</sup> However, many of them demonstrated knowledge of aquaculture practices as taught in the FNS.

### Aquaculture: Changes in Practices

FGD participants who either have access to their own household pond or who have husbands who culture fish in a collective pond discussed the changes in aquaculture practices (see Table 5). A few women started cultivating fish after learning about it from the FNS.

*No, I don't have any experience with fish farming, and my neighbor [FNS participant] was also not involved with fish farming. Actually, I heard about fish farming from the [FNS] training and asked help from the [SPRING union facilitator (UF)] because I have a very small pond beside my house, so I asked the [SPRING UF] how I could cultivate fish here and he gave me the instructions and I started farming. I thought since this place was unused, so I should start farming and I started it [a short time] ago and in this short time I have started consuming my fish. It is very useful because now we can eat fish almost regularly. If I catch one to two fish, then I can cook them with vegetables which is very good for us because it saves our money.*

— Alipur, Bakhra, Jhikorgacha, Jessore

---

<sup>11</sup> Collective ponds are owned by multiple individuals and decisions have to be made with agreement from everyone.

Table 6. Spillover changes in aquaculture

Change	Previous Practices	Practices Adopted from FNS
Pond Maintenance	<ul style="list-style-type: none"> <li>• No cleaning of the pond</li> <li>• No removal of predator fish</li> </ul>	<ul style="list-style-type: none"> <li>• Clean the pond with lime and potash or cow manure</li> <li>• Remove the predator fish</li> <li>• Clear the weeds and garbage from in and around the pond</li> </ul>
Feeding	<ul style="list-style-type: none"> <li>• Feed rice bran</li> <li>• Irregular feeding</li> </ul>	<ul style="list-style-type: none"> <li>• Make a fish meal ball with wheat husk and dry fish powder for fish at lower levels</li> <li>• Feed twice a day with any of the following: commercial food, mustard bran, egg yolk, wheat husk, poultry feed</li> <li>• Keep food in a bag in the middle of the pond with a stand</li> <li>• Sometimes spread food in corners of the pond</li> <li>• Using visibility of hand under water to determine feeding needs</li> <li>• Remove trees or branches so sunlight can support natural food growth</li> </ul>
Increased Varieties	<ul style="list-style-type: none"> <li>• Culture one variety</li> </ul>	<ul style="list-style-type: none"> <li>• Polyculture to allow 3-4 different fish varieties to live at different water levels</li> </ul>

## Pond Maintenance

The non-FNS participants described how they clean the pond before putting in the fingerlings to prevent disease and “gas” in the water. The overall technique discussed by participants can be summarized as follows: Before stocking or during the dry season, dry out the pond, clean all debris from the pond and away from the sides and put lime, potash, or cow dung in the water. FNS teaches that the cow dung and fertilizer help grow the fish food naturally.

*We clean up the pond with lime and potash now, so that fish get fewer infections and do not die. Previously, we didn't know about cleaning up or making ponds microbe free or germ free before starting fisheries.*

—Char Mansha, Guptomunshi, Bhola Sadar, Bhola

The non-FNS participants were cognizant of the connection between dirty water and disease in the fish, which hampers growth and can result in malnourished the fish, sores on their bodies, and other problems.

## Feeding

Feeding has changed for the fish, as well. Before, the fish were usually fed only rice bran, but now they are fed a mixture of food, including, occasionally, commercial feed. Women in the focus groups described how they now spread food for the fish in each corner of the pond for better distribution and how they also make food balls with wheat husk, rice bran, and fish feed for feeding low layers of fish in the pond (the balls are heavy and sink).

*I also collect cow dung<sup>12</sup> then dry it out, put it in a bag and then put that bag in the middle or corner of the pond to make natural food. Mostly, I feed them mustard oil cake, rice bran and sometimes commercial feed. Earlier, we just stocked fingerlings and sometimes gave only rice bran or cooked rice for feed, but not on daily basis. But now I give food two times a day regularly.*

—Imamghati, Rangasree, Bakerganj, Barisal

## Increased Varieties

Polyculture (or “layer” farming as the FGD participants called it) is a technique taught by FNS that supports more species of fish by combining in a pond species that occupy and feed in different layers, or water levels (i.e., top, middle, and bottom).

*Now we cultivate fish with the knowledge of the three-layer fish culturing. We get more fish by doing that. Previously, we didn't know about that.*

—Ashurail, Chakhar, Banaripara, Barisal

The layer method reduces competition among fish and maximizes use of available pond space, thereby supporting a greater variety and quantity of fish.

## Aquaculture: Benefits from Improved Practices

In over half of the FGDs with non-FNS participants whose households were practicing FNS aquaculture techniques, the benefits cited were increased consumption of fish, income generation, and cost savings from not buying fish at the market. Other benefits mentioned in the FGDs are increased production, time savings by not going to the market, and having fish to share with visitors and neighbors.

**Table 7. Benefits from aquaculture discussed in the FGDs**

Earn income	Increased production
Save money by not buying fish	Have fish to feed guests
Have more fish to eat	Do not have to go to the market to buy fish

<sup>12</sup> SPRING does not teach FNS participants to feed cow dung to the fish.

## Increased Production

The FNS techniques for aquaculture are designed to improve production. Women described how production had increased because the fish are not dying from disease as they were in the past. Cleaning and preparing the pond and giving more and different types of feed has resulted in more production for existing ponds and good production for new ponds.

*Earlier our fish were dying probably three times a year. We didn't understand the cause. The gas was created in the water due to dirtiness and the fish just floated on the water surface and died. Now we keep our pond water clean. So, the mortality rate has decreased and we get more fish.*

—Imamgathi, Rangasree, Bakerganj, Barisal

## Income Generation and Cost and Time Savings

For those non-FNS who are practicing FNS aquaculture techniques, some are earning an income, while others have only recently started. They are hopeful they will be able to earn money from selling fish in the future.

*By selling fish, the first time we got 10,000 taka (\$127), then we got 19,000 taka (\$240) [the next time] and recently we got 8,000 taka (\$101). Some fish were lost due to heavy rains [the last time]. But, previously, we didn't get that much taka by fish farming.*

—Ashurail, Chakhar, Banaripara, Barisal

*As we started [fish culture] very recently, we hope to get more fish, large fish, which we can eat anytime and fulfil our nutritional requirement. Actually, we are encouraged to see our neighbors [FNS participants]. Now we think we can sell also, so this will increase our family income.*

—Kismat Mahmudpara, Bashuari, Bagherpara, Jessore

The non-FNS participants said they were able to save money by eating fish produced in the pond instead of purchasing it in the market. They also appreciated the immediate access to fish that the pond provided.

*It is very useful because now we can eat fish almost regularly. If I catch 1–2 fish, then I can cook it with vegetables which is very much profitable for us and can save our money.*

—Alipur, Bakhra, Jhikargaccha, Jessore

*We don't need to go to the market to buy fish. It's a great help for us. We women can easily catch fish with a fishing hook and can cook it. That helps us a lot.*

—Ashurail, Chakhar, Banaripara, Barisal

## Increased Consumption of Fish

Increased household consumption of fish has helped households meet their nutritional needs. An added benefit, as cited by one participant, was the ability to serve fish to guests:

*Even when any guests come to visit our house we can catch fish and cook for them.*

—Kacchapia (Dhumketuabashan), Badarpur, Lalmohon, Bhola

## Aquaculture: Barriers and Challenges

Not having access to a pond was one of the most frequently cited barriers to fish farming.

If you have a pond you can easily do fish culture. But mostly we do not have an individual pond; we have more collective ponds and our husbands or sons are mostly working there.

—Char Mansha, Razapur, Bhola Sadar, Bhola

One of the non-FNS participants who is not practicing aquaculture, but whose husband does fish culture in a collective pond, said:

*They [husbands] cultivate in their own way so we can't tell them anything and also they do not listen to us.*

—Kholshi, Dumuria Sadar, Dumuria, Khulna

Not having a man in the household was cited as a barrier:

*Women who have no available man present in home, maybe the husband lives or works far away from home, they do not feel so comfortable to do fish cultivation by themselves.*

—Ashurail, Chakhar, Banaripara, Barisal

Flooding, either from tidal surges or heavy rain, was also cited as a challenge. Some of the participants said they started farming in a pond, but the fish washed away in the tidal surge or flood and they lost their investment.

*If tidal water or heavy rain didn't happen so frequently, then we can get benefits from it [fish culture]. Otherwise, we face losses. Heavy rain and tidal water make a hole in the pond and break the fence and the fish wash way to another water source. It does not give us benefits all the time.*

—Ashurail, Chakar, Banaripara, Barisal

Other difficulties cited included the costs of startup and maintenance, access to fingerlings, and disease. Some of the non-FNS women who are producing fish said they had no challenges or difficulties.

## Nutrition and Health

SPRING uses the Essential Nutrition Actions platform to teach FNS participants about nutrition and discuss antenatal care (ANC), postnatal care (PNC), and lactation. Non-FNS women in the FGDs said they heard the nutrition and health advice and information from different sources, specifically, the FNS, family welfare assistant, community clinics, and media (radio, TV), which disseminate similar messages, corroborating and reinforcing each other.

### Nutrition and Health: Changes in Practices

Due to the multiple channels of information flow on nutrition and health in the communities, it is difficult to pinpoint what non-FNS have learned from FNS and what they have learned from other channels, as well as what new knowledge they have and what practices they have adopted as a result. However, the FGD facilitators did ask specifically where information came from and what practices were adopted as a result of FNS and that information is presented here. Not all women participating in the FGDs had infants or young children at the time of the FGD.

*We learned many things from the UF [Union Facilitator] and our neighbor [FNS participant] also, but mostly from the UF because during the training [FNS session] sometimes we came to see the training.*

—Shonkorpor, Shonkorpor, Jhikargaccha, Jessore

After talking to FNS graduates, we learned about food and nutrition.

—Bakarkathi, Rangasree, Bakerganj, Barisal

We know about complementary feeding from the health worker, the community clinic, from TV and radio, and also in the FNS.

—Ashurail, Chakhar, Banaripara, Barisal

Overall, the more common changes discussed in the FGDs were dietary changes related to increased quantity of foods and improved quality of diet, including exclusive breastfeeding and appropriate complementary feeding. Table 8 gives the changes listed by FGD participants.

**Table 8. Spillover changes in nutrition and health**

Change	Previous Practices	New Knowledge and Practices Adopted from FNS
Better Nutrition	<ul style="list-style-type: none"> <li>Children and adults consume few fruits and vegetables compared to staple foods</li> <li>Children and adults, especially women, consume inadequate amounts of animal source foods</li> </ul>	<ul style="list-style-type: none"> <li>Prepare and eat more fruits and vegetables</li> <li>Children eat more vegetables</li> <li>Eat more kinds of foods</li> <li>Eat more animal source foods</li> <li>Healthy snacks</li> </ul>
Care of Mother during Pregnancy and Lactation	<ul style="list-style-type: none"> <li>Irregular antenatal care visits</li> <li>Mothers limit food during pregnancy to prevent big babies</li> <li>No emphasis on eating diverse diets</li> <li>Few animal source foods eaten by women</li> <li>Family members do not help women with domestic work</li> <li>Women not allocated time to breastfeed</li> <li>Women do not take rest during pregnancy</li> <li>No IFA supplementation during pregnancy and lactation</li> </ul>	<ul style="list-style-type: none"> <li>Regular antenatal care visits</li> <li>Consume more food during pregnancy and lactation</li> <li>Eat more fruits and vegetables with a focus on dietary diversity during pregnancy and lactation</li> <li>Eat more animal source foods</li> <li>Rest for the mother, help from family members</li> <li>IFA supplementation during pregnancy and lactation</li> </ul>
Infant and Young Child Feeding Practices	<ul style="list-style-type: none"> <li>Delayed initiation of breastfeeding</li> <li>Introduction of complementary foods prior to six months</li> <li>Inappropriate complementary feeding for age</li> </ul>	<ul style="list-style-type: none"> <li>Early initiation of breastfeeding immediately following birth</li> <li>Exclusive breastfeeding until the child is six months of age</li> <li>Appropriate complementary feeding practices</li> </ul>
Lactation Position and Attachment	<ul style="list-style-type: none"> <li>Improper attachment with only the nipple in the mouth</li> </ul>	<ul style="list-style-type: none"> <li>Proper attachment with the areola in the mouth</li> </ul>



## Better Nutrition

Focus group participants reported that families and children are eating more vegetables and animal-source foods than before they learned about nutrition from the FNS. Animal source foods, particularly eggs and liver, are given to children more often now because parents understand their importance for growth. In one FGD, for example, participants explained how they previously avoided feeding their children liver, as the older generation believes liver is harmful for children's digestion. Now, the women say they know from nutrition messaging that liver is important for "increasing blood"; it is also soft so they feed it to children as a complementary food. To encourage children to eat home-cooked food, some mothers are serving the food on colorful plates. One group specifically discussed how a colorful plate or bowl encourages children to eat.

*Egg, meat, fish, iodized salt, sea fish, small fish and all types of green vegetables and homemade food are needed for children, pregnant women and lactating women's well-being.*

—Ashurail, Chakhar, Banaripara, Barisal

*Previously, children weren't attracted by home food, but now we try to get them to taste different types of food items. We give them this food in colorful plastic plates or glasses so they feel attracted to eat it. Sometimes, we use separate small bowls or plates for them. We cook more vegetables and green leaves now at home. So, all of the family members are now accustomed to eating more vegetables. Previously, we tried to avoid giving liver (chicken or beef liver) to children. Older people say it's harmful for children's digestion. But now, we know it's important for increasing blood and it's soft to eat. So now it is given to children to eat.*

—East Arsulia, Chakhar, Banaripara, Barisal

*Before, we gave only the yolk of the egg to the children with the thinking that yolk has more vitamins than the white part. But now we know that the whole egg has different types of vitamins and we should try to give them a whole egg to eat.*

—East Arsulia, Chakhar, Banaripara, Barisal

Mothers and other caregivers say they are now more cognizant of the importance of the food that children are eating and provide healthy snacks, such as yellow fruits, seasonal fruits, and eggs.

*Now we give healthy snacks to our child two times a day, but before we didn't do that and for snacks we give different seasonal fruits like banana, yellow papaw, mango and boiled egg.*

—Kholshi, Dumuria Sadar, Dumuria, Khulna

## Infant and Young Child Feeding Practices

Under the Essential Nutrition Actions platform, SPRING FNS promotes early initiation of breastfeeding, exclusive breastfeeding, and appropriate complementary feeding, which are all components of infant and young child feeding. Non-FNS participants discussed the benefits of early initiation of breastfeeding, including the benefits of colostrum and the connection with immunity and long-lasting health benefits.

*After delivery, as early as possible, we have to start only breastfeeding for better mental and physical development of the children. Actually we heard this message from FNS and from the community clinic.*

—Pukuriyavita, Darajhat, Bagherpara, Jessore

The non-FNS women talked about the importance of exclusive breastfeeding for six months, which, they noted, included not giving water to babies. They said breastfeeding is good for the baby's health and contains all the necessary nutrients, but they also said it is good for the mother by helping her relax and reducing her workload by obviating the need to prepare baby food.

*Only breast milk [should be given] because we believe that breastmilk contains all food, even water also. By doing this, the mother has no tension and it also decreases mother's extra workload to make extra food.*

—Kacchapia (Chandrima Abashan), Badarpur, Lalmohon, Bhola

*Now we know that children will take only breastmilk until six months after their birth. Children will get all type of nutrients from breastmilk. They don't need even a drop of water during that time. By exclusive breastfeeding, children grow well and it increases their immune system.*

—Guptomunshi, Purbo Elisha, Bhola Sadar, Bhola

*Children should take only breastmilk until six months. They even don't take any drop of water during that time. After six months, they will take some extra homemade food for their good health. That's called complementary feeding. We learned this from FNS graduate [name of neighbor] and other staff of SPRING.*

—East Arsulia, Chakhar, Banaripara, Barisal

The FGD participants were also able to specify that complementary feeding, or feeding foods other than breastmilk, should start after six months and should be centered on a diverse diet with fruits and vegetables and animal source foods. Although there were inconsistencies in the quantity of complementary foods that should be given, there was general agreement that children over six months of age should be eating food in addition to breastmilk. Non-FNS participants discussed how complementary feeding helps give children required nutrients, develops their brains and immune system, and helps them grow.

*After six months, we have to start complementary food because after six months, for the child to fulfill their requirements, just breastmilk is not enough. So, we have to start complementary food.*

—Kismat Mahmudpara, Bashuari, Bagherpara, Jessore

*Now we give complementary food, especially various types of homemade foods to the children. It helps them to develop their brains, helps them more for mental and physical growth. It increases their immune system.*

—Guptomunshi, Purbo Elisha, Bhola Sadar, Bhola

*Earlier, we didn't know exactly about the starting age of complementary food after six months and also we didn't feed our children measuring by a 250 ml bowl. We just fed them from our plate when we were eating. But, now, as we get a bowl from SHIKHA [another USAID project in the area] and learned about complementary feeding from the FNS graduate, we try to follow their suggestions. We make khichuri [mixture of lentil soup and rice] with some rice, leafy vegetables and lentils because only rice and lentils are not enough for nutrition. Now [FNS participant name] suggested to us to add some vegetables to get more nutrition. If some days we can manage fish or eggs, then we also add that in the children's meal.*

—Kacchapia (Chandrima Abashan), Badarpur, Lalmohon, Bhola

*We learn many things from the sister (UF) and try to maintain that. Sometimes we came to the training, but it was not always possible, but if needed, we ask sister because she comes here very often. Now we know and practice some new things: we take a bowl of 250 ml and give ½ bowl of food 3 times in a day until nine months with a little liquid and gradually we increase the quantity until two years we give a full bowl of food. We also try to give three types of food, like we give protein to get strength and lentils, rice, fish and egg in the food of child.*

—Kholshi, Dumura Sadar, Dumuria, Khulna

One participant from Imamgathi, Rangasree, Bakerganj, Barisal who has a 14-month old girl and an eight-year old son said she was unaware of the recommendations on complementary feeding and snacks when her son was born. She did not breastfeed him for a full six months due to [perceived] milk insufficiency. She attributed her son's thinness and frequent illnesses to this practice. However, with her daughter, she said she tries to follow all the practices she learned from the FNS graduate. Now she says she can see the difference between the two children.

### **Care of Mother during Pregnancy and Lactation**

SPRING teaches FNS participants about the importance of regular ANC visits, advising women to have a minimum of four, as well as attending postnatal care visits to check on the health of the mother and baby. FNS participants also learn that it is important to have family/household support for pregnant and lactating women to allow time for rest and breastfeeding and not to have too heavy of a workload. Proper lactation techniques (e.g., position and attachment) are also taught. As discussed above, FNS participants learn about dietary diversity and consumption of fruits, vegetables, and animal-source foods to increase nutrient intake.

*Pregnant mothers should visit the health clinic a minimum of four times in the pregnancy period. If she goes more than that, it will be better. Lactating mothers should also visit the health clinic for vaccination of the children. Besides that, if there are any complications like excessive bleeding or others, the mother should go to nearest health center as soon as possible.*

—Char Mansha, Razapur, Bhola Sadar, Bhola

*We know that during pregnancy, we need to visit a doctor four times, but after the delivery there is no need to visit the doctor.*

—Shonkorpor, Shonkorpor, Jhikargaccha, Jessore

The non-FNS participants in the FGDs said a pregnant woman should visit the doctor for checkups during pregnancy; some FGD participants were able to recount the recommendation from the FNS that a pregnant woman should have a minimum of four antenatal checkups. They may have also become aware of this recommendation from health service providers, who conduct ANC visits in some of the villages. Fewer FGDs participants talked about post-natal visits. However, they did discuss visiting a health service provider for complications following pregnancy.

*During the training [FNS in their village], we were pregnant and after learning from the training we started practicing that [ANC visits], but doctors from the community clinic also said to do that.*

—Shonkorpor, Shonkorpor, Jhikargaccha, Jessore

*During pregnancy, we eat taro leaves, red amaranth, Indian spinach and sweet pumpkin for improved brain development of the newborn.*

—Kacchapia (Chandrima Abashan), Badarpur, Lalmohon, Bhola

*We know that during pregnancy and after delivery, the mother has to go to the health care center at least four times to know the condition of the mother and her child.*

—Dakhindihi, Damador, Phultala, Khulna

FGD participants said that pregnant women should start taking iron folate tablets after three months of pregnancy. Some said to continue up to three months postpartum and others said they were not sure whether iron-folic acid (IFA) was recommended for lactating mothers. Among the participants with children of school age or older, some had heard of taking IFA when they were pregnant, but did not realize how important it was and therefore did not take it.

*We know about iron capsules from FNS and community clinics, but before, we didn't receive any iron tablets because we did not have knowledge in that time like now.*

—Damudor Hajrapara, Damador, Phultala, Khulna

Now, they have heard the recommendations from the FNS and from SPRING UFs, as well as from health service providers.

*If we do not take this [IFA], we will be weak, and hazy. This information we got from the FNS and from the local level health worker.*

—Char Mansha, Razapur, Bhola Sadar, Bhola

## **Lactation Position and Attachment**

There were inconsistencies among the non-FNS participants on correct positioning and attachment when holding a baby to breastfeed. However, several of the women discussed making sure the baby had the areola in its mouth, allowing him to breastfeed on demand, and ensuring all of the milk from one breast is emptied before switching to another.

*During breastfeeding, we have to hold the baby very well, give not just the nipple, but with the black areola also. After finishing one breast, then start another breast because the first milk is water and the last milk is hind milk. So, we have to maintain this process. We learned this from SPRING personnel.*

—Dakhindihi, Damador, Phultala, Khulna

*Thick milk comes last, so if the baby does not complete one breast and then goes to other breast, then it will miss the thick milk with more nutrients. We learned this information from the FNS.*

—Char Mansha, Razapur, Bhola Sadar, Bhola

## **Nutrition and Health: Benefits from Improved Practices**

In all of the FGDs, participants said they have made changes to their nutrition practices because they see the health benefits, particularly for their children. Other benefits discussed are cost savings associated with producing healthy food at home and not having to spend money on healthcare because of fewer child illnesses.

**Table 8. Benefits from nutrition and health practices**

Improved Health
Cost Savings
Brain Development/Intelligence

### **Improved Health**

The FGD participants cited the importance of the following nutrition practices: eating diverse foods, including fruits and vegetables and animal source foods, early initiation of exclusive breastfeeding until six months of age, and the introduction of diverse complementary foods after six months of age. They described having changed their eating habits to keep their children and families healthy and well.

*We knew before that eggs are good for health, but now we learned that eggs have a lot of vitamins and everyone needs them.*

—Alipur, Bakhra, Jhikargaccha, Jessore

*Earlier, we ate only one item [with rice], maybe lentils or leafy vegetables, but now we try to eat diversified foods each day to get all vitamins and keep our children healthy.*

—Kacchapia (Chandrima Abashan), Badarpur, Lalmohon, Bholia

The FGD participants noted how better nutrition for women was good for their families. As one woman put it:

*If we are not well, we can't do our daily household work." They also discussed how early initiation of breastfeeding and exclusive breastfeeding help keep a baby's immune system strong and the children, therefore, healthy.*

—Bakarkathi, Rangasree, Bakerganj, Barisal

*Breastfeeding and complementary feeding will improve the health and meet nutritional requirements of our children. As a result, the child gets healthy and more intelligent.*

—Damudor Hajrapara, Damador, Phultala, Khulna

### **Brain Development/Intelligence**

The non-FNS FGD participants highlighted the importance of colostrum and the long-term health benefits of breastfeeding:

*Within the first hour of delivery, we give colostrum to our child because the doctor said it helps to construct a good brain for the child and the sister (SPRING UF) said it works as a first immunization and helps the mother recover quickly. However, commercial advertisements are also telecast on TV about that.*

—Kholshi, Dumuria Sadar, Dumuria, Khulna

*From 0–6 months, we feed only breast milk because it helps brain development. If we feed other foods, children might be attacked by diseases like measles, typhoid and pneumonia. To meet the baby's thirst, we breastfeed more frequently.*

—Bakarkathi, Rangasree, Bakerganj, Barisal

## Cost Savings

In several groups, non-FNS participants mentioned that by cooking at home, the family was able to save money by eating less food prepared outside the home and by spending less on healthcare thanks to their children's improved health.

## Nutrition and Health: Barriers and Challenges

Only a few challenges to adopting good nutrition and health practices were discussed by the non-FNS participants. One group mentioned the cost of transportation and the distance to the clinic for ANC and PNC checkups; they noted, however, that they had recently benefited from better access because the government is sending a health service provider to the village for ANC. Notably, the non-FNS participants said they became aware of the importance of ANC from the FNS.

Many women reported that they had stopped taking IFA tablets, as they caused nausea, headaches, and vomiting.

## Hygiene

An integral component of SPRING's approach to improving nutrition outcomes is to promote essential hygiene actions, which include handwashing at critical junctures,<sup>13</sup> installing a low-cost handwashing station (i.e., a tippy tap) in convenient and opportune locations in homes (e.g., near kitchens and latrines), and food safety (e.g., washing vegetables before cutting them, keeping utensils clean). The tippy tap is made from a plastic bottle that provides access to clean water within the household. Because of the emphasis SPRING places on handwashing, the FGD facilitators led non-FNS participants in a discussion focused specifically on handwashing before moving into a larger discussion on nutrition and health. The findings from the handwashing discussion are presented first, separate from the remaining nutrition and health findings.

## Hygiene: Changes in Practices

Non-FNS participants reported having changed their handwashing practices since the farmer nutrition schools were introduced to their villages. In all FGDs, participants discussed adopting tippy taps, handwashing at proper times with soap, and the importance of proper hygiene for disease prevention.

It is important to note that the FGDs were discussions about improved practices and not surveys to collect information on the frequency of practices. In 2014, for example, a SPRING survey found differences in reported and actual practice. As part of that study, SPRING collected information from women who participated in an FNS and women who lived in villages where there was no FNS. Information collected included reported frequency of handwashing and observations of handwashing behavior (SPRING 2015). Despite the probable variation in the

---

<sup>13</sup> Critical junctures included mother using the toilet, another adult/caregiver using the toilet, children using the toilet, caregiver cleaning child's bottom after defecation, caregiver disposing of child's stool, before food preparation, before feeding a child, before eating, and after handling livestock.

sample of non-FNS in the current study, the FGD participants not only reported changes in behavior, but also demonstrated spillover from FNS by describing the various critical junctures and proper method for handwashing (they even discussed tippy taps). Table 9 shows the changes that non-FNS women report making to their handwashing practices after learning these practices from the FNS.

Table 9. Spillover changes for handwashing

Change	Previous Practices	Practices Adopted from FNS
Food Safety	<ul style="list-style-type: none"> <li>• Did not wash vegetables with clean water and soap</li> <li>• Did not keep utensils and kitchen cleaned with soap</li> </ul>	<ul style="list-style-type: none"> <li>• Wash vegetables with clean water and soap</li> <li>• Clean utensils with soap</li> </ul>
Handwashing	<ul style="list-style-type: none"> <li>• No handwashing station in the home</li> <li>• No use of clean water (e.g., tube well)</li> </ul>	<ul style="list-style-type: none"> <li>• Tippy Tap in at least one convenient place in the home (e.g., kitchen and latrine)</li> <li>• If no Tippy Tap, setting up soap at the tube well</li> <li>• Use of tube well water</li> </ul>
	• Wash hands with only water	• Wash hands with soap
	• Wash only one hand	• Wash both hands
	• Not wash hands after defecation	• Wash hands after defecation
	• Not wash hands after cleaning child's bottom after defecation	• Wash hands after cleaning child's bottom after defecation
	• Not wash hands before food preparation	• Wash hands before food preparation
	• Not washing hands before eating	• Wash hands before eating
	• Not washing hands before feeding a child	• Wash hands before feeding a child
	• Not washing hands after handling waste/garbage	• Wash hands after handling waste/garbage
• Not washing hands after handling livestock	• Wash hands after handling livestock	

## Food Safety

The non-FNS participants talked about the importance of cleaning fruits and vegetables with soap and clean water before cutting them to reduce the risk of getting sick from germs and other harmful substances that may be on the outside.

*Now we wash the vegetables before cutting them, otherwise all the vitamins go away with the water.*

—Kholshi, Dumuria Sadar, Dumuria, Khulna

*Now we wash vegetables before cutting.*

—Pukuriyavita, Darajhat, Bagherpara, Jessore

They also said they have learned from FNS to keep kitchen utensils and the kitchen itself clean with soap and water.

## Tippy Taps

All FGD participants knew of tippy taps and most of them said they have two tippy taps in their homes—one by the kitchen and one by the latrine. They described the process taught in the FNS for making the tippy tap (with some variation): puncture a hole in a clean plastic bottle and hang it near the latrine and/or kitchen and keep soap nearby. They also talked about using clean water from the tube well to fill the tippy tap, or to wash their hands directly at the tube or at an improvised handwashing station.

*Yes, all of us have a tippy tap at home. We wash our hands before cooking, before and after eating, before feeding a child, after coming from the toilet and also after doing any work by which our hands get dirty.*

—Fulbaria, Dumuria Sadar, Dumuria, Khulna

*The tippy tap is the first thing we saw in the FNS. We learned it only from the FNS. We had not seen it before. Now, we learned a lot about handwashing. We use the tippy tap for handwashing and keep tube well water inside it.*

—Ashurail, Chakhar, Banaripara, Barisal

*We learned [about tippy tap] from FNS [name].” and “When training was going on in the yard, we saw how to make the tippy tap.*

—Imamgathi, Rangasree, Bakerganj, Barisal

Tube water, drawn from deep wells, is a source of clean water in Bangladesh. Most women said they use tube well water for their tippy taps, unless the tube well is far away. In those cases, they fill their tippy taps with pond water. Additionally, women with tube wells very near their actual home (i.e., inside the yard) say they do not need to hang a tippy tap in their homes, but choose to keep soap by the tube well and wash their hands there.

*Now we use tippy taps for handwashing. Earlier we didn't wash hands before cutting vegetables, but now we do. Sometimes we wash our hands only with water, but now we try to wash by soap all the time.*

—Bakarkathi, Rangasree, Bakerganj, Barisal

*Before, we washed hands, but not always and sometimes used soap, sometimes just water. We never followed the handwashing steps [learned from FNS]. We didn't use a tippy tap, which is very effective for handwashing.*

—Dakhindihi, Damador, Phultala, Khulna

There were no negative responses to the question about whether the tippy tap was easy to use for handwashing.

## Handwashing at Critical Junctures

Many non-FNS participants noted that before learning about handwashing from the FNS, they did not wash their hands as often after their own or their children's defecation or before food preparation, eating or feeding a child. They also talked about the practice of washing hands after cleaning/handling waste or garbage and after caring for livestock/handling livestock waste. While some women said they knew to wash their hands with soap before they heard about handwashing from the FNS, most said they never washed their hands at all of the junctures



taught under the essential hygiene actions platform used by SPRING FNS (note: the FGD participants did not use the terminology “essential hygiene actions”). Before, they used ash or only water for washing their hands.

*We wash our hands before eating and feeding our children and after defecation. Also, during cooking when we put spices [in the food], after that we wash our hands.*

—Kacchapia (Chandrima Abashan), Badarpur, Lalmohon, Bhola

*Earlier, when our child would cry because it was hungry, we fed it in a hurry, only washing my hands with water. But now, I know just water can't clean our hands, so I wash my hands with soap to prevent germ infection in my child. Because handwashing takes only a little bit of time.*

—Bakarkathi, Rangasree, Bakerganj, Barisal

## Hygiene: Benefits from Improved Practices

In over half of the FGDs with non-FNS women, participants said the benefits of having a tippy tap are that it is convenient and easy to use and saves water and time (see Table 10). All of these benefits lead to increased handwashing, which reduces illness and improves health, also noted in over half of the FGDs.

**Table 10. Benefits from tippy taps and handwashing.**

Close to home/easy access	Improved health/reduced illness from germs
Saves water	Increased handwashing
Easy to use	Portable

### Tippy Tap is Easy to Use

FGD participants noted that the tippy tap made handwashing easier because it did not require them to pump the tube well every time they washed their hands.

*When we need to wash our hands we open its cap and water comes out easily.*

—Bakarkathi, Rangasree, Bakerganj, Barisal

*We don't have to go far and we have soap and water together in one place. Moreover, we don't forget to wash our hands properly because in the kitchen we have to wash our hands frequently, so it helps us that time.*

—Fulbaria, Dumuria Sadar, Dumuria, Khulna

### Tippy Tap is Close to Home/Easy Access/Time Savings

Those who did not have a tube well close by or some other type of handwashing station expressed satisfaction with the convenience of the tippy tap (also evidenced in the quotations above under “Tippy Tap is Easy to Use”). Those who had another means of handwashing have improved their handwashing practices by placing soap at that station. The FGD participants talked about how having a handwashing station near the kitchen and latrine means they do not have to travel far to wash their hands, which is poses a safety concern at night.

*It is easier to wash hands because our tube well is slightly far from our house and at night it is very difficult to go far, but using the tippy tap, we can wash our hands easily and don't have to go far.*

—Alipur, Bakhra, Jhikargaccha, Jessore

Not having to go far to wash hands also saves time:

*It is feasible for us because it is very close and it takes less water for handwashing. As our tube well is far away from our home, so earlier sometimes we feel lazy to go there for handwashing. Now as tippy tap is very close to our kitchen, so we can wash our hands whenever we need to. It also reduces the chance of germ infection.*

—Imamgathi, Rangasree, Bakerganj, Barisal

## **Tippy Tap Saves Water**

The tippy tap is convenient because it does not require hand pumping from a well or carrying water from the pond. It also helps save water. The design of the tippy tap regulates water flow through a tiny hole at the bottom of the bottle and by loosening or tightening the cap on the top. The focus group participants said saving water was a benefit of using the tippy tap.

*It is very useful and feasible for handwashing as it is near to our home and needs little water for washing hands.*

—Bakarkathi, Rangasree, Bakerganj, Barisal

*We can wash hands with little water and can wash hands quickly and don't have to go far.*

—Shonkorpor, Shonkorpor, Jhikargaccha, Jessore

## **Increased Handwashing**

The FGD participants reported that they were washing their hands more often since learning about the improved practices, having a handwashing station located conveniently nearby, and learning about the connection between handwashing, germs, and illness. The non-FNS women said that in addition to being convenient and easy to use, the tippy taps helped remind them to wash their hands, especially in the kitchen where, in the past, they would have had to walk over to the tube well.

*Earlier, we would be lazy and sometimes forget, but now that the Tippy Tap is in front and close to us, so we try to change our behavior.*

—Kacchapia (Chandrima Abashan), Badarpur, Lalmohon, Bhola

Now they see the tippy tap and can stay in one place and wash their hands before and during food preparation.

*We have a tube well at home, but despite that, we hung the tippy tap because most of the time we feel lazy to wash our hands, but if the tippy tap is there, we can wash our hands promptly and we also don't forget. The kitchen also has a similar priority because all foods are kept there, so we need to wash our hands in different times of cooking like after cutting the vegetables and after washing utensils.*

—Kholshi, Dumuria Sadar, Dumuria, Khulna

## Improved Health and Reduced Illness from Germs

Across the FGDs, participants clearly articulated the connection between germs, handwashing, and illness. The FGD participants talked about how knowing that handwashing can prevent illness by reducing germs motivates them to wash their hands.

*Now we know that the germs cannot be seen with the naked eye and to clean it we must use soap.*

—Bakarkathi, Rangasree, Bakerganj, Barisal

*Before, we washed our hands merely with water, but in the [FNS] we heard that our hands contain many bacteria and diseases, so if we don't wash our hands properly they will go into our mouths. So now, after coming from the toilet and especially before eating we wash our hands with soap, which was not practiced before, but now everyone is aware about it.*

—Kholshi, Dumuria Sadar, Dumuria, Khulna

*If we want to be free from diseases, then we have to maintain hygiene at home, such as to clean the utensils with safe water. During cooking we have to use safe water and handwashing should be practiced by all family members.*

—Pukuriyavita, Darajhat, Bagherpara, Jessore

The rationale given by some women for hanging a tippy tap near the kitchen is that food is kept and prepared there and the kitchen should be clean and hands should be clean to prepare food. Likewise, a tippy tap is hung near the latrine or soap is kept by the nearby tube well because the latrine is said to have many germs or to be dirty.

*We put it [tippy tap] beside the kitchen because our bathroom is very near to us. We chose this place because from this place we can easily wash our hands before cooking and whenever we need.*

—Dakhindihi, Damador, Phultala, Khulna

*We chose those places because hands need to be cleaned in these two places; mostly because in the kitchen, we have all of the food, so we have to keep it clean. The toilet carries all the germs and we know that from before. Moreover, our tube well is a little far from the toilet, so we hang the tippy tap near the toilet.*

—Shonkorpor, Shonkorpor, Jhikargaccha, Jessore

The FGD participants also talked about the benefit of reducing germs by washing vegetables with soap and clean water before preparing the food and keeping the kitchen and utensils clean.

*Now, we not only practice handwashing, we wash our utensils with detergent which we never did before.*

—Damador hajrapara, Damador, Phultala, Khulna

## Handwashing: Barriers and Challenges

The non-FNS participants did not recall any major difficulties or challenges with tippy taps or handwashing; however, some mentioned that the children would sometimes play with them or destroy them:

*But we...place the tippy tap in a little bit higher place to prevent children from disturbing it.*

—Dakhindihi, Damador, Phultala, Khulna

A few FGD participants also said finding a bottle for use could be difficult, and sometimes they needed to purchase one. However, they felt the benefit made it a worthwhile investment.

*Sometimes it is difficult to find a bottle and we have to buy it from the market, but for our health and to keep away from disease we are using it. Otherwise, we don't face any problem. Rather, everyone in our family also likes it very much and especially our children.*

—Fulbaria, Dumuria Sadar, Dumuria, Khulna

Notwithstanding the potential discrepancies between reported and actual behavior, women in the FGDs said they were washing their hands more often and could describe the appropriate times and methods for handwashing. Many said they were using a tippy tap and no one with either a tippy tap or alternative handwashing station cited barriers that prevented them from washing their hands.

# Analysis and Discussion

---

*The rural people don't do anything without a benefit.*

—Bakarkathi, Rangasree, Bakerganj, Barisal

The findings from the FGDs show that spillover occurred when the non-FNS participants perceived a benefit from adopting new practices; in particular when the benefit outweighed the consequences of continuing old behaviors. The knowledge they gained from the FNS provided a revised sociocultural filter through which the non-FNS viewed the consequences of poor nutrition. Further, the simple, doable actions for nutrition, hygiene, and production promoted by the FNS provided a sense of self-efficacy that empowered the women to change their behavior (see Health Belief Model and Social Cognitive Theory). The non-FNS participants saw the FNS participants in their communities modeling the new behaviors and were able to see positive, tangible results, which motivated them to try the new practices themselves (see Social Network and Diffusion of Innovation theories). Advice from FNS participants and SPRING UFs (i.e., cues to action), seeing others in their communities who were trying new things with good results, gaining capacity to perform simple, doable actions, and mass media and communications from other sources that reinforce the messages, together helped catalyze behavior change in a spillover effect for non-project participants.

The adoption of behaviors due to perceived benefits occurred not only for the nutrition and hygiene behaviors, but also for production behaviors. Some production practices were adopted because of the returns the non-FNS saw from the FNS households and because of the low financial investment required for a large return, such as changing to a bed or pit garden, making compost at home, making pesticides at home, changing seed and seedling planting and management, using an improved nesting pot, separating diseased chickens, cleaning the ponds, and removing predators. Although these practices may require a time investment, the increased yield of diverse and nutritious foods is a benefit that outweighs the extra resources required. Throughout the FGDs, non-FNS participants said the changes they have made to production practices has given access to diverse foods, saves money and/or earns additional income, and improves the health of their children.

Non-FNS participants reported that fish farming, or aquaculture, required a higher investment and carried a higher risk. If, for example, the tidal surge or flooding from heavy rain causes a loss of fish, it is more devastating than if, by comparison, the chicken coop or house is destroyed by winds or water, because the cost for replacement and the value of the property loss is higher (based on the reported income from selling fish versus selling poultry or eggs). Thus, the risk, combined with limited access to a pond, may result in fewer people adopting improved fish culture techniques. It is possible that the provision of fingerlings to FNS participants mitigates this risk, but there is no existing data on FNS perceptions of benefits, risks, and barriers.

## Thematic Analysis of Benefits

The benefits that were discussed in the FGDs were analyzed through the coding of the narrative text to arrive at four primary themes: Food and Nutrition Security, Economic Gains, Women's Empowerment, and Social Capital (see Table 9). The categories of data, or sub-themes, were derived from the discussions by the non-FNS participants and not imposed on the data. The descriptive titles of the primary themes were determined by the authors to describe the categories into which the data organically fell.

Table 11. Analysis of Benefits for Adopting FNS Practices.

Primary Themes	Sub-Themes	Benefits
Food and Nutrition Security	Availability and Quantity	Meets family's food needs
	Access to Produce	Year-round production
		Increased yield
		Increased number of varieties
	Use of more and diverse produce	Consumption of more micronutrients
		Meet family's nutritional needs
	Improved health	Stronger immune systems from consumption of diverse foods
		Reduced disease from handwashing and food safety
		Reduced exposure to chemicals/toxins from chemical-free production techniques and from improved hygiene practices
	Economic Gains	Cost-savings
Save money on fertilizer		
Save money on pesticides		
Save money on healthcare		
Income generation		Earn income from selling produce, poultry, eggs, fish
Women's Empowerment	Convenience and decision-making power	Can access foods without waiting for male family member to bring from market
		Immediate decision-making power over what to cook and time use
	Valued contribution to household/self-efficacy	Providing family's food
		Providing income for family
		Safeguarding and contributing to family's health
	Social Capital	

## Food and Nutrition Security

The benefits of the new practices, as described by non-FNS participants, underscore the three pillars of food and nutrition security: access, availability, and use. Increased yield and year-round production of nutritious and diverse foods increases access and availability, while the ENA/EHA platform educates women about the use of the foods for nutrition and health. When the FNS participants share their knowledge of production practices and health and nutrition with non-FNS community members who, in turn, put that knowledge into practice, it increases availability and access to nutritious foods in the community overall, providing women with the food resources to put into practice what they learned through the ENA/EHA education, either as an FNS-participant or a non-FNS community member. Improved access, availability, and use of nutritious foods contributes to improved food and nutrition security and safeguards families during times of crisis.

The focus group discussions demonstrated that the non-FNS participants recognized the relationship between food, nutrition and health. Participants perceived improved family health from consuming more nutrients and understood the benefits it provided to the immune system. The findings from the FGDs suggest the motivation to improve health, in particular of children, whether through improved nutrition and hygiene practices, improved infant and young child feeding practices, or improved care of pregnant and lactating women, is strengthened when women believe they can successfully put into practice the knowledge they have gained about health and nutrition.

## Economic Gains

Although improved health was cited as a motivating factor to engage in improved production practices (horticulture, poultry, and aquaculture), economic gains (either from income generation or cost savings) were also cited. Non-FNS participants described how households are able to reduce expenditures on market purchases by eating from their own home production, reduce expenditures on fertilizers and pesticides by making their own with available materials, and even reduce healthcare costs thanks to the health benefits of nutritious foods.

In addition to saving money by reducing costs, some of the non-FNS participants are able to sell surplus produce and generate more income for the household. Earned income is spent on children's education, household goods, re-investing in their own production costs, and helping the household with cash crop production costs.

The practices promoted by SPRING FNS involve using lower cost inputs, but result in higher yields than the methods the non-FNS were previously practicing. The cost savings and income generation brought about by the FNS practices are attractive returns for a population where the majority lives below the poverty line, with limited opportunities for income generation.

## Women's Empowerment

By practicing horticulture, poultry production, and aquaculture, women have been able to provide those essential foods previously lacking from their families' diets without adding to the household expenditures. By teaching women about nutrition and hygiene in conjunction with production, FNS participants learn not only how to produce food, but how it contributes to better nutrition and health. Cooking for the family is an integral part of a woman's role and identity in Bangladesh. Through horticulture production at home, women have more control over decisions regarding cooking and food consumption. Having access to the garden gives women decision-making power over what they cook and when they cook, a benefit cited repeatedly by focus group participants who appreciated the convenience of quickly accessing produce from the garden and not having to wait for their husbands or someone else to go to the market.

The FNS practices have allowed women to generate income without violating sociocultural norms on women's mobility and interaction with men, which may make this form of income generation more acceptable to their husbands and in-laws. Although women did not explicitly say they feel empowered by having more control over what is cooked and served to the family, contributing to family income through their own work, or contributing to family health by producing nutritious food for their families, the discussions around these topics indicate a positive change in the way they and their family members view their role in the family. Equipping women with the skills to produce diverse and nutritious foods at home, creating access and availability in a culturally-acceptable manner (i.e., foods are available at home and women can access them without relying on someone to bring them from the market), and providing the knowledge to prepare and serve those foods to support optimal child growth empowers women to take charge of the health of the family.

### The Spillover Effect: Households Influenced

The study looked at spillover effects in **16** FGDs in **15** villages across **4** districts. The findings from the transect walks that were used to select FGD participants showed that at least **8–10** households around each FNS village have been influenced to adopt practices at varying levels. Therefore, it is possible that SPRING influenced at least **8–10** households in each FNS village throughout our implementation area. With approximately **6,421** FNS throughout SPRING's zone of influence, that could translate to over **64,000** additional households that have adopted practices from the SPRING FNS, despite not participating in the program.

## Social Capital

Food plays an important social role in keeping families and communities together and can function as a form of social capital. Social capital is the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition—i.e., to membership in a group (Bourdieu 1986). Across the FGDs, the non-FNS participants discussed the benefit of having surplus produce to give away to family and neighbors and being able to serve visitors meat, eggs, and fish. In addition to being recipients of gifted produce, neighbors are prime customers for buying the surplus produce from the home. Therefore, the woman becomes a community resource and small business person, which can also build her social capital and standing in the community.

Food behaviors can be integral components of role performance within a sociocultural context, with expectations such as serving flesh foods (i.e., animal-source foods) to guests and sharing with neighbors and family members. The inability to meet those sociocultural expectations could have negative impacts by disrupting the reciprocity in the social network that low-income communities tend to rely on, which is considered a component of food security for a community (Buchthal 2012). The women in the FGDs explicitly discussed having access to and availability of food, in particular flesh foods, to serve to guests and share with neighbors as a benefit of adopting new practices. This draws attention to an unintentional positive effect on food security by SPRING FNS: the production of diversified foods helps households achieve the resources to fulfill sociocultural expectations of reciprocity.



## Conclusion

---

The findings from the focus group discussions with non-FNS participants from villages where farmer nutrition schools had occurred underscore the potential scalability and sustainability of the FNS practices through the demonstrated capacity to spread beyond just the project beneficiaries. The FNS participants modeled new knowledge and skills and practices to their neighbors and relatives and spread these directly and indirectly. The perceived benefits that motivated non-FNS women to adopt new practices were centered on increased yield and increased access to and availability of diverse and nutritious foods, cost and time savings, income generation, and improved health and nutrition. These benefits can be translated into larger development themes: food security and nutrition security, economic growth, women's empowerment, and social capital. The new practices empowered women to take control over the health of their children while also contributing to economic gains for their households. Furthermore, they helped households meet sociocultural expectations around the role of food in the social network. For some, the loss of financial investments was a deterrent to starting over (e.g., gardens and fish lost to floods), but for most, the continued returns compounded into multiple benefits was substantial enough to adopt and continue improved production, nutrition and hygiene practices.

In sum, the non-FNS participants were motivated to adopt new behaviors, or practices because the perceived benefits were substantial and outweighed the challenges or barriers to change. Once they recognized the benefits of the new behaviors, their own perceived self-efficacy was a driver of change. Drawing from Diffusion of Innovation theory, we could consider the SPRING FNS participants to be "early adopters," as they adopted new practices with the support and training from SPRING. Once the other community members saw a benefit and realized their own self-efficacy (in line with the health benefit model and social change theory), they became the "early majority" and "late majority" in terms of behavior change. If the practices were seen to be empowering women in socioculturally acceptable ways—through increased agency or self-efficacy to adopt/enact new practices that benefit their family, both in terms of health and economics—the practices were more likely to "spill over."



## References

---

- Asian Development Bank. 2013. *Gender Equality and Food Security: Women's Empowerment as a Tool against Hunger*. Mandaluyong City, Philippines: Asian Development Bank.
- Bourdieu, Pierre. 1986. "The Forms of Capital." In *Handbook of Theory and Research for the Sociology of Education*, edited by J. Richardson (1986), 241-58. Westport, CT: Greenwood.
- Buchthal, Opal. 2012. "The Role of Social Capital in Changing Dietary Behavior in a Low-Income Multi-Ethnic Community." Dissertation submitted to the Graduate Division of the University of Hawai'i at Manoa.
- Food and Agriculture Organization of the United Nations (FAO). 1996. *World Food Summit Rome Declaration on World Food Security*. <http://www.fao.org/docrep/003/w3613e/w3613e00.htm>.
- Langworthy, M., and Caldwell, R. 2009. *Jibon o Jibika Program End-Line Survey Report*. Tango International. [http://pdf.usaid.gov/pdf\\_docs/Pnads875.pdf](http://pdf.usaid.gov/pdf_docs/Pnads875.pdf)
- SPRING/Bangladesh. 2014. "Bangladesh." <http://www.spring-nutrition.org/countries/bangladesh>
- SPRING. 2015. *Use of Tippy Taps and Handwashing Practices in Southern Bangladesh: Qualitative Study*. Arlington, VA: Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) project.
- Stretcher, V. and Rosenstock, I.M. 1997. "The Health Belief Model." In *Health Behavior and Health Education: Theory, Research and Practice*, edited by K. Glanz, F. M. Lewis, and B. K. Rimer. San Francisco: Jossey-Bass.



## Annex 1. Practices Promoted by Farmer Nutrition Schools

Vegetable Gardening	Poultry Rearing	Pond Fish Culture	ENA/EHA
Understand the importance of vegetable and nutritional value	Explain the importance of native chickens and the improved management for increasing their production	The importance of fish culture	Nutrition during pregnancy
Select the appropriate sites for vegetable gardening	Demonstrate the methods and basic tasks for separating chicks from the mother	The different types of ponds for fish culture	Nutrition during lactation
Make a proper plan to grow diverse vegetables throughout the year	Use of improved housing system for chickens	The ideal pond environment for fish culture	Nutrition for children under 6 months of age
Select the appropriate seasonal crops and the right species	Improved methods for rearing laying hens	Different fish culture systems	Nutrition for children ages 6–11 months
Establish the appropriate planting beds and pits for better production	How to select broody hens and eggs for hatching and the factors to consider during the incubation period	Production planning for pond fish culture	Nutrition for children ages 12–24 months
Properly use organic fertilizer for preparation of planting beds and pits	Food management and care of broody hens	The importance of pond preparation	Nutrition during and after childhood illness
Explain and practice the methods for sowing seeds in the beds	Understand how to house and brood chicks	Steps of pond preparation	Handwashing before cooking
Tell and show the methods of planting seedlings in the pits	Establish a feeding and drinking schedule for chicks	Water extraction	Handwashing before feeding the child
Explain where, when and why to apply the compost and/or organic fertilizer, what should be the amount and what techniques to follow	Identify symptoms of various diseases and their control	Prepare/repair pond side, wipe out aquatic weeds	Handwashing after using the toilet
Explain how and why to irrigate the garden and drain out the excess water	Maintaining bio-security	Eliminate unwanted fish and predatory fish that eat other fish	Keeping cooking utensils clean
Identify major nutritional shortages for vegetables	Know the nutritional value and importance of consuming eggs and meat produced by the	Water supply	Using a sanitary toilet (adults and children)
Improve soil health in homestead area		Application of lime	
		Application of fertilizer	
		Examination of natural food	
		Identify different food habit of fish and species selection	
		Stock fish according to the layer of pond, density and accurate time of stocking	
		Identify good quality of	

Vegetable Gardening	Poultry Rearing	Pond Fish Culture	ENA/EHA
<p>Apply organic fertilizers on the surface</p> <p>Prepare compost/manures</p> <p>Understand the importance of organic manures</p> <p>Agronomic control methods</p> <p>Mechanical control methods</p> <p>Biological control methods</p> <p>Chemical control methods</p> <p>Identify the difference between good and poor quality seeds</p> <p>Identify the different types of seeds</p> <p>Understand the methods for growing quality seeds</p> <p>Know the techniques of sorting quality seeds, collecting and storing those seeds</p>	<p>household, especially PLW and children</p>	<p>fingerlings</p> <p>Transport fingerlings properly</p> <p>Understand the adaptation of fingerlings</p> <p>Release fingerlings properly</p> <p>Understand the importance of supplementary feeding, quantity and method of application</p> <p>Prepare supplementary feed</p> <p>Explain the importance, quantity and method of fertilizer application</p> <p>Explain the importance, quantity and method of lime application</p> <p>Observing fish growth and health and the necessary tasks</p> <p>Partial harvesting and restocking</p> <p>Complete harvesting of fish</p>	



**SPRING**

JSI Research & Training Institute, Inc.  
1616 Fort Myer Drive, 16th Floor  
Arlington, VA 22209 USA

Tel: 703-528-7474

Fax: 703-528-7480

Email: [info@spring-nutrition.org](mailto:info@spring-nutrition.org)

Web: [www.spring-nutrition.org](http://www.spring-nutrition.org)

