Hugh Waddington
Howard White

Farmer field schools
From agricultural extension to adult education

March 2014

Systematic Review Summary 1

Agriculture and adult education

International Initiative for Impact Evaluation

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About this summary report

This report, *Farmer field schools: from agricultural extension to adult education, 3ie Systematic Review Summary 1*, is a summary of the full review that is designed to be useful to policymakers and practitioners. The full review and all of its appendixes will be available through the Campbell Collaboration in September 2014. All content is the sole responsibility of the authors and does not represent the opinions of 3ie, its donors or the 3ie Board of Commissioners. Any errors are the sole responsibility of the authors. Questions or comments about this review should be directed to the corresponding author, Hugh Waddington at hwaddington@3ieimpact.org.

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- *Farmer field schools: global project portfolio systematic review*, by Daniel Phillips, Gracia Pacillo and Howard White*
- *Why targeting matters: a systematic review of farmer field school targeting*, by Daniel Phillips, Hugh Waddington and Howard White**
- *Farmer field schools: results of qualitative synthesis*, by Birte Snilstveit, Martina Vojtkova, Daniel Phillips and Philip Davies*
- *Farmer field schools for improving farming practices and farmer outcomes: results of effectiveness synthesis*, by Hugh Waddington and Jorge Garcia Hombrados*

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** Phillips, D, Waddington, H and White, H, accepted. *Why targeting matters: a systematic review of farmer field schools targeting*. Development Studies Research.

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List of figures, tables and boxes

Abbreviations and acronyms

AFFOREST	African farmers' organic research and training
BCR	benefit-cost ratio
EU	European Union
FAO	Food and Agriculture Organization
FFS	farmer field school
ICM	integrated crop management
ICPM	integrated crop and pest management
IFAD	International Fund for Agricultural Development
IPM	integrated pest management
IPPM	integrated production and pest management
NGO	non-governmental organisation

Foreword

The 3ie systematic review of farmer field school (FFS) interventions is a welcome addition to development literature. As an approach that has reportedly reached an estimated 12 million farmers in over 90 countries, it is an important review to undertake. Since FFS projects were introduced in Indonesia in the late 1980s, there has been much debate among academics, scholars and policymakers regarding the approach. As a development approach, FFS has been used – and abused – in many ways. Some people see FFS as a type of agricultural extension, some see it solely as an adult education approach, and others see it as an attractive way to dress up transfer of technology.

In reality, FFS has a very particular philosophy and methodology that is based on (among other things) discovery-based experiential learning and group approaches. It is a rather special approach that uses elements of pedagogy and social capital to influence agricultural practices, and includes a growing emphasis on empowerment. For these reasons, FFS projects are quite difficult to evaluate, simply because they are difficult to define. Once operationally defined by reviewers, teasing out the different elements (technical and agricultural, social and educational) and separating the FFS component from the often broader interventions of which they may be a part – for example, a food security project including research, extension and input supply – is also problematic.

Both academic and grey literature abounds with cases of FFS. This 3ie FFS systematic review summary report brings all of this together using rigorous methodology to provide both technical and policy messages to bear on this important topic. While long, the policy report condenses some 500 papers on the topic into a manageable document with clear messages for policymakers and understandable figures and tables, written in clear language without jargon. The report gives information on the background and history of FFS, design, theory of change, targeting, implementation, effectiveness and finally, implications. The chapter highlights provide succinct messages on each of the sections.

Importantly, the authors point out the dangers of falling into a one-size-fits-all approach that some countries and donors have taken when adopting FFS as their main approach. Instead, they point out the need for a more thoughtful, best fit approach, using FFS selectively where it best suits local situations and needs. Those looking for a quick fix or formulæ on how to achieve instant reduction of food insecurity or other development outcomes will be disappointed. But for those willing to explore and thoughtfully analyse what they really want – and if and how FFS could help them achieve it – this report will help.

Kristin Davis
Executive Secretary, Global Forum for Rural Advisory Services
Research Fellow, International Food Policy Research Institute

Executive summary

Since the late 1980s, support to agriculture has moved from top-down agricultural extension towards more participatory approaches which better suit smallholders. One such approach is the farmer field school (FFS), an adult education intervention which uses intensive discovery-based learning to promote skills. Although an estimated 12 million farmers have been trained by FFS in over 90 countries across Asia, Africa and Latin America, the effectiveness of this approach has long been a subject of debate.

Drawing on a systematic review of over 500 documents, this study finds that, although FFS projects have changed practices and raised yields in pilot projects, they have not been effective when taken to scale. The FFS approach requires a degree of facilitation and skilled facilitators, which are difficult to sustain beyond the life of the pilot programmes. FFS typically promotes better use of pesticides, which requires hands-on experience to encourage adoption. As a result, diffusion is unlikely and has rarely occurred in practice.

Farmer field schools

Objectives

FFS projects aim to curb the over-use of pesticides and other harmful practices, to empower disadvantaged farmers such as women, and to build farmers' skills to become more resilient and adaptive to shocks. The share of projects that have empowerment objectives has risen to over 80 per cent in the last decade.

The FFS approach aims to provide skills in crop cultivation and resource management using sustainable agricultural production methods such as integrated pest management (IPM).

UN organisations with a special interest in agriculture, the Food and Agriculture Organization (FAO) and the International Fund for Agricultural Development (IFAD), have led the way in the expansion of FFS.

Project design

FFS projects have three stages:

- In the inception phase, facilitators are trained, a curriculum is developed and farmer groups formed.
- In the training phase, farmers attend weekly sessions in a nearby field, preferably with a control plot, where an FFS facilitator oversees curriculum implementation.
- Finally, many FFS projects aim to disseminate knowledge to the wider community, through informal communication or formal methods such as training of farmer trainers.

Theory of change

FFS programmes aim to provide skills to improve agricultural, health and environmental outcomes, and empower farmers. Achieving these outcomes means training suitable facilitators, targeting appropriate farmers to attend the full training schedule and undertaking activities to promote dissemination and diffusion.

Participants should gain knowledge and adopt new practices, which in turn should increase yields. The policy environment should be conducive to impacts being achieved, which means input prices and other incentives should not discourage farmers from adopting FFS-promoted practices. Where production is for market, there should be reasonable market access.

Systematic review findings

Targeting farmers

The majority of FFS projects targeted better-off farmers, which appears to have been successful. Half of the projects used pro-poor targeting, which did not always succeed in reaching the target groups because targeting mechanisms favoured elites or the characteristics of more disadvantaged target groups made it difficult for them to participate. Programmes have had mixed success in reaching women.

Implementation experiences

Design and implementation range from FAO-promoted participatory adult education programmes to approaches that are closer to top-down 'chalk and talk' agricultural extension.

Facilitator selection and training are crucial components in determining the quality of FFS training. Many programmes are closer to traditional extension approaches than the participatory learning approach advocated by the FFS programme founders, partly because of problems in identifying appropriate facilitators and training them in the necessary skills and approaches.

Only a minority of FFS programmes support activities to institutionalise the FFS approach at the community level through farmer clubs, and so encourage sustainable adoption and diffusion.

Impacts for participating farmers

Farmers participating in FFS projects typically benefit from improved outcomes along the causal chain, including knowledge and adoption of beneficial practices, agricultural production and profits. However, this evidence mostly comes from smaller-scale pilots. For larger FFS programmes implemented at national scale over longer periods there is no evidence of positive effects. Problems in recruiting and training appropriate facilitators and a lack of back-stopping and support for community-based approaches have impeded scaled-up programmes.

Diffusion to non-participant farmers

Neighbouring farmers who do not participate in FFS projects do not benefit from diffusion of knowledge about IPM from trained farmers. The experience-based nature of the training and the importance of observing advantages over conventional farmer practices prevent diffusion to neighbours.

Cost-effectiveness

FFS projects are unlikely to be cost-effective in comparison with other approaches such as agricultural extension. Although FFS projects may be a more cost-effective way of empowering the poor, there is insufficient evidence on empowerment impacts to say whether this is the case.

Implications

For policy

The FFS approach will not solve the problems encountered by large-scale agricultural extension programmes, and should be used selectively to solve particular problems in particular contexts. When FFS is used – for example, to address farming practices which are especially damaging to the environment – efforts should not be counteracted by price distortions or other factors.

For practice

Recruitment of appropriate facilitators is crucial for effective implementation. Training of facilitators should focus on participatory techniques and facilitation skills and emphasise the need to use language and concepts which are familiar to farmers. Facilitators should also have access to ongoing support and back-stopping from experts.

Different objectives of FFS are best met through different targeting approaches. Targeting better-off farmers is more conducive to agricultural impacts, since they are better able to adopt the practices. Empowerment goals may be better met by targeting disadvantaged farmers, although there is very little evidence on empowerment outcomes of FFS.

For research

The rigorous evidence base is small. There are few rigorous impact evaluations, especially for programmes at scale, and there are none based on cluster-randomised assignment, a feasible approach for FFS. Moreover, there is very little evidence about other important benefits of FFS, such as empowerment, environment and health. There is a need for rigorous evaluations measuring these broad outcomes, and for mixed-method evaluations which interrogate the causal chain to determine whether FFS programmes can be made effective at scale.

Farmer field schools: from agricultural extension to adult education

1

Chapter highlights

- Farmer field school projects are a bottom-up participatory approach that aim to empower farmers and improve agricultural outcomes.
- Since the Food and Agriculture Organization (FAO) first introduced them in Indonesia in 1989, farmer field schools have reached over 12 million farmers in 90 countries.
- This report presents a systematic review of over 500 documents to assess the effectiveness of farmer field schools.

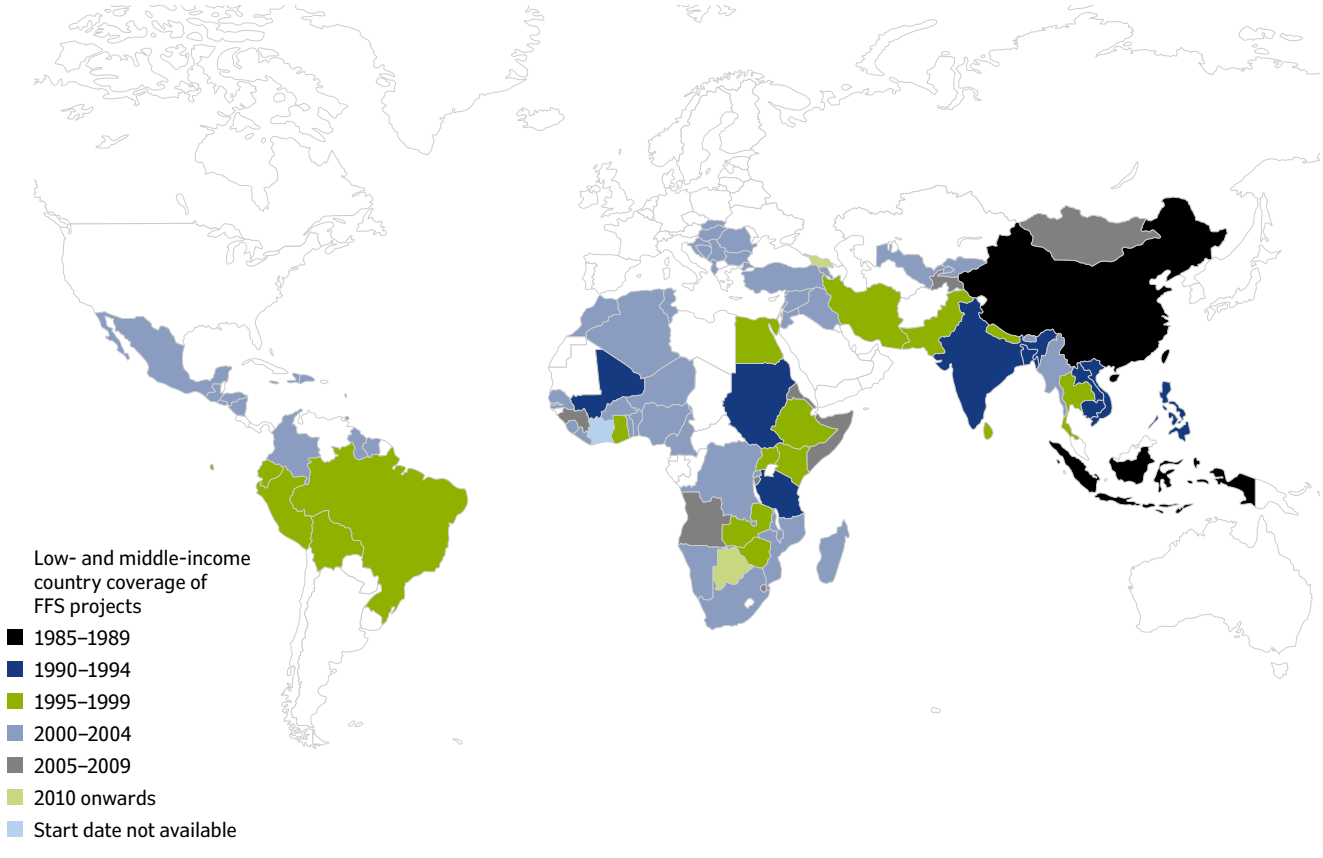
According to the *World Development Report on Agriculture*, after a long period of decline in development support, agriculture and agricultural extension in particular are now back in favour.[1] Poverty reduction strategies in 24 African countries have listed extension as a top agricultural priority.[2] Nevertheless, the age-old question about what works in supporting agriculture remains unanswered. This study aims to help answer this question for farmer field schools (FFS), a relatively new approach to reaching smallholders around the world.

1.1 The need for a new approach for smallholders

The Green Revolution in the 1960s and 1970s improved agricultural yields, raising production and food security. However, two challenges also emerged. First, modernisation was associated with adverse environmental and health consequences, as a result of water pollution, declining soil quality, soil erosion, pest resistance and loss of biodiversity.[3] Second, poor farmers were being left behind. In particular, many of the technologies promoted at this time were not appropriate for African smallholders, and women in particular.[4] Existing agricultural extension and advisory services were ineffective in meeting these challenges.[5]

Agricultural extension has traditionally transferred farm management practices and technologies developed in research stations to farmers. The approach has largely been top-down, as characterised, for example, by the World Bank's Training and Visit System. Following the perceived failure of such top-down approaches,[6] different – more participatory – approaches have emerged, notably FFS.

Figure 1: Global coverage of FFS projects



1.2 The FFS approach

Since the 1980s, more participatory training methods have been adopted to create spaces for farmer self-learning and sharing, and also to allow agents and agricultural researchers to learn from farmers.[7] One such approach is FFS, an adult education method rooted in Paulo Friere's dialogical education approach.[8]

FAO developed FFS projects as a means of empowering farmers by improving their analytical and decision-making skills. FFS projects are used to communicate complex ideas such as integrated crop management (IPM)[9] while also empowering farmers by strengthening their skills, problem-solving capabilities and confidence.

Starting with Indonesian rice farmers in 1989, FFS projects have been introduced in at least 90 countries worldwide (see Figure 1), and have produced over 12 million graduates.[10] Around 60 per cent of beneficiaries have been in Asia, including many rice and cotton farmers.[11] However, over half of all FFS projects have been in Africa, starting with the FAO's Gezira Scheme in Sudan in 1993. African FFS projects cover staples, vegetables and tree crops (cocoa and tea). The International Potato Center first introduced FFS in Latin America in 1999.

1.3 The effectiveness of FFS

There have been hundreds of evaluations of FFS design and implementation. These studies have conflicting findings, so the effectiveness of FFS remains a matter of debate.

An influential impact evaluation of Indonesia's IPM-FFS programme concluded that 'the programme did not have significant impacts on the performance of graduates and their neighbours' in promoting appropriate pesticide use, or yields.[12] These negative findings contributed to the World Bank pulling out of the Global IPM Facility multi-donor trust fund.[13]

However, reviews drawing on multiple studies report more positive findings. A review of 25 IPM-FFS evaluations concluded that 'studies reported substantial and consistent reductions in pesticide use attributable to the effect of training… Results demonstrated remarkable, widespread and lasting developmental impacts'.[14]

In addition to the debate on effectiveness, the scalability and financial sustainability of FFS has been questioned. While pilot projects have sometimes been effective, it is not clear whether farmers have the time and resources to participate in field schools, or whether public agricultural systems have the capacity and resources to manage the fiscal obligations required for a long-term public training programme.[15] This report aims to address this unresolved debate.

1.4 The systematic review approach and structure of this report

A systematic review collects and synthesises all available high-quality evidence, appraises it and uses transparent synthesis methods to draw conclusions for policy and practice.[16] There are no previous systematic reviews of the evidence regarding farmer field schools.[17]

This report summarises a systematic review of evidence on the effectiveness of FFS. It uses a theory-based approach to examine evidence along the causal chain from programme design and implementation through to impacts.[18] We address the overall question of effectiveness by asking the following:

- What are the main objectives and design features of FFS?
- What is the theory of change by which FFS is supposed to work?
- How do FFS projects target beneficiaries? What types of farmers participate? How effective is FFS targeting?
- What are the experiences of implementing FFS projects? What are the enablers of, and barriers to, effective and sustainable implementation?
- What are the effects of FFS projects on participating farmers? Is there diffusion to neighbouring farmers?
- Is FFS a cost-effective approach?

This summary report (referred to herein as the report) is based on the following four reviews:

1
a global portfolio review including studies and evaluations of FFS projects and project documents[19]

2
a review of FFS targeting objectives, mechanisms and outcomes[20]

3
an effectiveness review and statistical meta-analysis of quantitative studies on the impacts of FFS projects[21]

4
a qualitative review of the barriers and enablers for FFS projects[22]

In addition to the above, data on cost-effectiveness from projects included in the review of effectiveness were also analysed.

As shown in Figure 2, initial search identified some 28,000 papers, the majority of which were not about FFS programmes and therefore excluded from the analysis. Nearly 500 (460) potentially relevant studies were reviewed in detail; 195 of which were included in the systematic review, along with 337 FFS project documents.

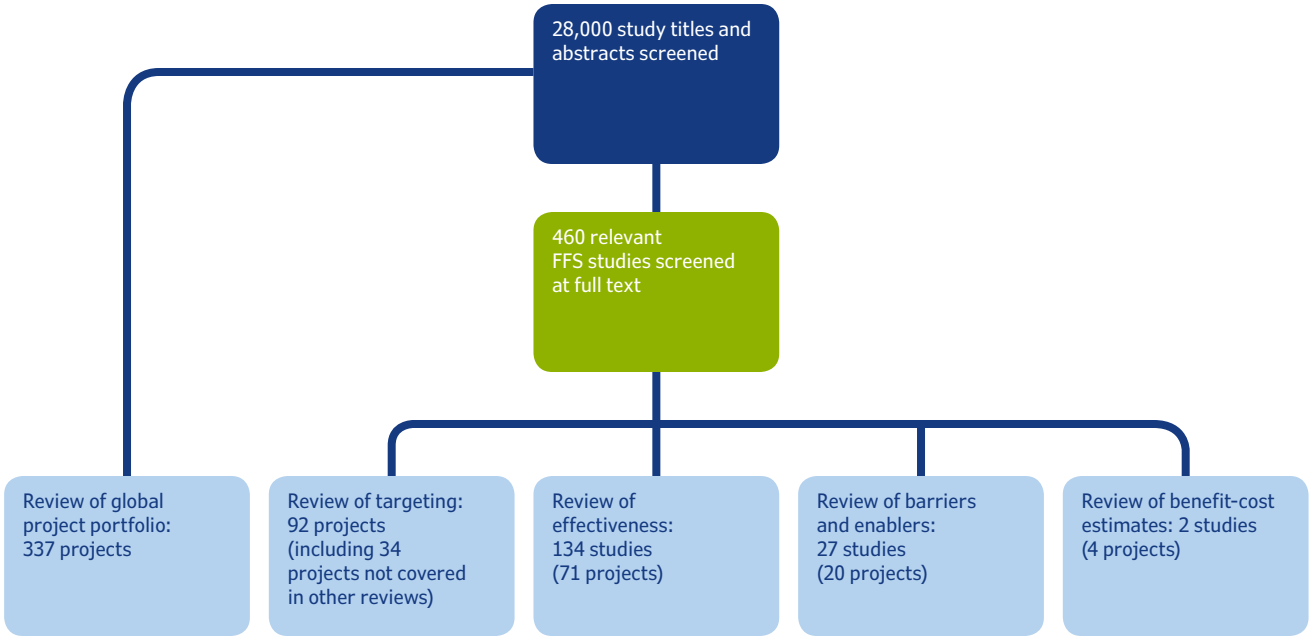


Figure 2: Reviews used in the study

Note: The portfolio review and reviews of barriers and enablers and effectiveness are chapters in the full systematic review, *Farmer field schools for improving farming practices and farmer outcomes: a systematic review*, on which this summary report has been based. Waddington, H, Snilstveit, B, Hombrados, J, Vojtkova, M, Phillips, D, Davies, P and White, H, 2014. *Farmer field schools for improving farming practices and farmer outcomes: a systematic review*. Campbell Systematic Reviews, The Campbell Collaboration, Oslo. Available at: http://www.campbellcollaboration.org/lib/project/203/. The full systematic review of targeting is reported in Phillips, D, Waddington, H and White, H, accepted. *Why targeting matters: a systematic review of farmer field schools targeting.* Development Studies Research.

Chapter 2 draws on the global portfolio review of 337 projects to present the design of FFS projects, following which Chapter 3 discusses the theory of change. Chapters 4 and 5 discuss FFS targeting and other aspects of implementation respectively, drawing on the qualitative synthesis of 27 studies (20 projects) and the targeting review, which covered 92 projects. Chapter 6 examines the impact of FFS on beneficiaries and their neighbours, drawing on the effectiveness review of 134 studies of 71 FFS projects and the qualitative synthesis of barriers and enablers. Chapter 7 discusses cost-effectiveness, using cost data from the global portfolio review and four cases of benefit-cost analysis. Finally, Chapter 8 draws out implications for policy, programme design and future research.

How are farmer field schools designed?

2

Chapter highlights

- FFS projects have empowerment objectives, as well as objectives related to agricultural production.
- The majority of FFS projects focus on pesticide management.
- FFS projects have three stages: inception, farmer training and dissemination.
- FFS has been mostly funded by FAO and International Fund for Agricultural Development (IFAD).

FFS is an intensive approach in which farmers learn to manage their crops using more natural methods such as IPM. Various organisations have implemented FFS with different objectives, including improving agricultural outcomes and empowering farmers. This chapter presents evidence on FFS design.

Figure 3: FFS project objectives

Note: Most projects have multiple objectives, therefore total sums to greater than 100 per cent.

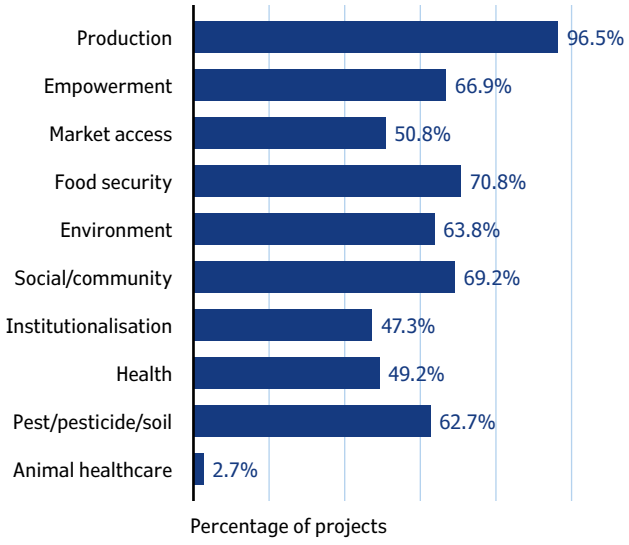
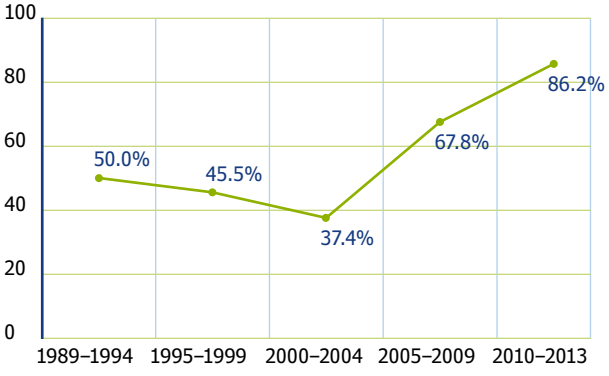


Figure 4: FFS projects with an empowerment objective



2.1 FFS objectives

FFS projects aim to provide training in agricultural techniques and develop skills to empower farmers.

An FAO manual describes a FFS as a school without walls where farmers learn in groups by trying out new ideas in their own fields, where this process empowers farmers to develop their own solutions to their own problems.[23] Figure 3 shows how, despite being essentially agricultural projects with production or food security objectives, 67 per cent of FFS projects also have empowerment objectives.[24]

The FAO-EU Pest Management Programme for Cotton in Asia, for example, aimed to promote sustainable, profitable and environmentally sound cotton production by encouraging farmers and extension staff to practise IPM.[25] Its other agricultural objectives included improving agricultural practices such as pesticide use, soil management, animal healthcare, improving the public extension system and increasing market access.

Cambodia's national IPM programme, on the other hand, aimed 'to empower people to actively solve… problems by encouraging active participation, self-confidence, dialogue instead of lectures, joint decision making and self-determination.'[26] Likewise, one of the Bangladesh Agriculture Sector Support Programme's objectives was 'to empower farmers to become experts on their own farms and to be more confident in solving their own problems'.[27]

Figure 4 shows how the share of FFS projects with an empowerment objective has risen in the last decade. Projects have been reoriented in this direction. For example, the objectives of the first phase (1999–2002) of the IFAD-FAO FFS project in East Africa were 'to increase the competence of the extension system, establishing networking capacity for exchanging FFS experiences and contribute to knowledge on the effectiveness of the approach.'[28] The second phase (2005–2008) included empowerment objectives to 'broaden the scope of FFS, and establish the skills and methodologies necessary to enable the FFS to respond to farmers' demands'.[29]

Other FFS objectives include reducing gender inequality, targeting minority groups, community development and strengthening producer groups. In Bangladesh, the agricultural extension programme's immediate objectives were 'Improved, demand-driven, integrated, and decentralised extension systems developed to support poor, marginal and small farmer households'.[30]

Almost half of the FFS projects analysed in the systematic review had a health objective, either through education or by reducing harmful chemicals used in agriculture. In addition, nearly two-thirds (64 per cent) included an environmental objective through education on the environment and climate change, sustainable land and water use, reduction of negative environmental impacts from farming and protection of the local environment and existing natural assets.

2.2 Crop management technologies used in FFS projects

The early FFS projects in Asia introduced IPM to tackle overreliance on chemical pesticides.[31] An FFS seeks to communicate the perhaps counter-intuitive message that using less pesticide results in higher yields, a message which is contrary to what farmers hear from commercial agents.

Although FFS projects have evolved, and many focus their training on different soil management or production techniques (see box, opposite), pest management remains the focus of the large majority of FFS projects (see Figure 5), with variations reflecting regional priorities and contexts. Over half (54 per cent) of the FFS projects focused on IPM. Integrated production and pest management (IPPM) projects implemented in Africa – such as the IFAD-FAO FFS projects in Kenya, Tanzania and Uganda – comprise nine per cent of all FFS programmes worldwide. Techniques such as ICM (4 per cent of all FFS programmes) and ICPM (2 per cent) have been primarily implemented in Africa and Latin America.

All these approaches share a focus on cultivating crops and managing resources through the application of scientifically developed techniques, usually based on natural processes and developed by agricultural researchers.

While the early FFS projects targeted rice farmers, as the approach has spread to other regions it has been adapted to a wide variety of crops and livestock. The majority of projects reviewed (92 per cent) target specific crops, in particular cotton, cereal crops such as maize, root crops such as potatoes, vegetables, tree crops (cocoa, tea or coffee) and fruit. Over a third of the projects have supported livestock farming – mainly poultry, cattle and sheep and goats.

Box 1:
Varieties of crop management technology

Integrated pest management (IPM): Based on the life cycles of pests and their interaction with the environment to manage pest populations economically, while minimising risks to the environment or human health.

Integrated production and pest management (IPPM): A variant of IPM that has evolved in Africa, emphasising pest management and growing healthy crops.

Integrated crop management (ICM): Based on the interactions between soil, the natural environment and biological pests or weeds to promote sustainable crop production.

Integrated crop and pest management (ICPM): Combines chemical, biological and cultural pest control methods with crop management strategies.

Other pesticide management: Chemical or pesticide management techniques.

Soil management: Soil or crop management techniques.

Other: This category includes other variants of IPM or other general references to management techniques. Examples include: integrated disease management; integrated water management; integrated pest and vector management; and integrated pest biosystem management.

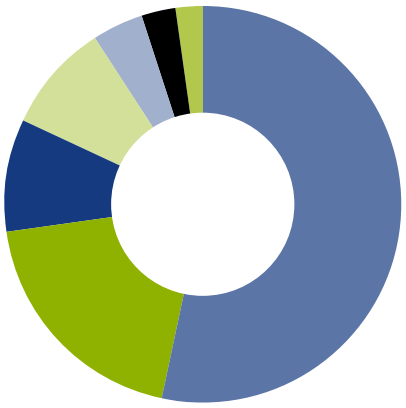


Figure 5: Technology incorporated in FFS projects

- Integrated pest management (IPM) 53.6%
- Other pesticide management 19.2%
- Soil management 9.4%
- Integrated production and pest management (IPPM) 8.9%
- Integrated crop management (ICM) 4.0%
- Other pest, pesticide or soil management 2.7%
- Integrated crop and pest management (ICPM) 2.2%

2.3
Components of FFS projects

Figure 6 illustrates the three stages of an FFS project: inception, farmer training and dissemination.

Inception

This initial stage includes recruiting and training facilitators, developing the curriculum, group formation activities and setting up project management functions such as monitoring and financial systems.

The curriculum defines the programme's main focus. It is built around a flexible set of techniques and components; content is determined in consultation with farmers and consistent with local conditions. The curriculum can include additional field studies, depending on local field problems. A FFS curriculum should commonly also include special topics tailored for each FFS.

According to FAO guidelines, there is plenty of room for variation in FFS, as long as it results in a learner-centred, participatory process that relies on an experiential learning approach.[32] Curricula can also be developed using participatory technology development methods, in which communities identify problems and test solutions and learning materials which are made by farmers and consistent with local conditions.[33]

Facilitators can be recruited from extension agency staff or selected FFS graduates of a training-of-trainers course. The latter is more likely in larger scale, longer-term projects. For example, in the Indonesian IPM programme, an initial cohort of extension trainers helped to train groups of farmer trainers. Around 20 per cent of projects distinguish between extension and farmer trainers, and for these projects half of FFS facilitators are farmer trainers. However, in Africa 70 per cent of facilitators are extension workers.

Nearly all projects (90 per cent) included activities to form farmer groups.

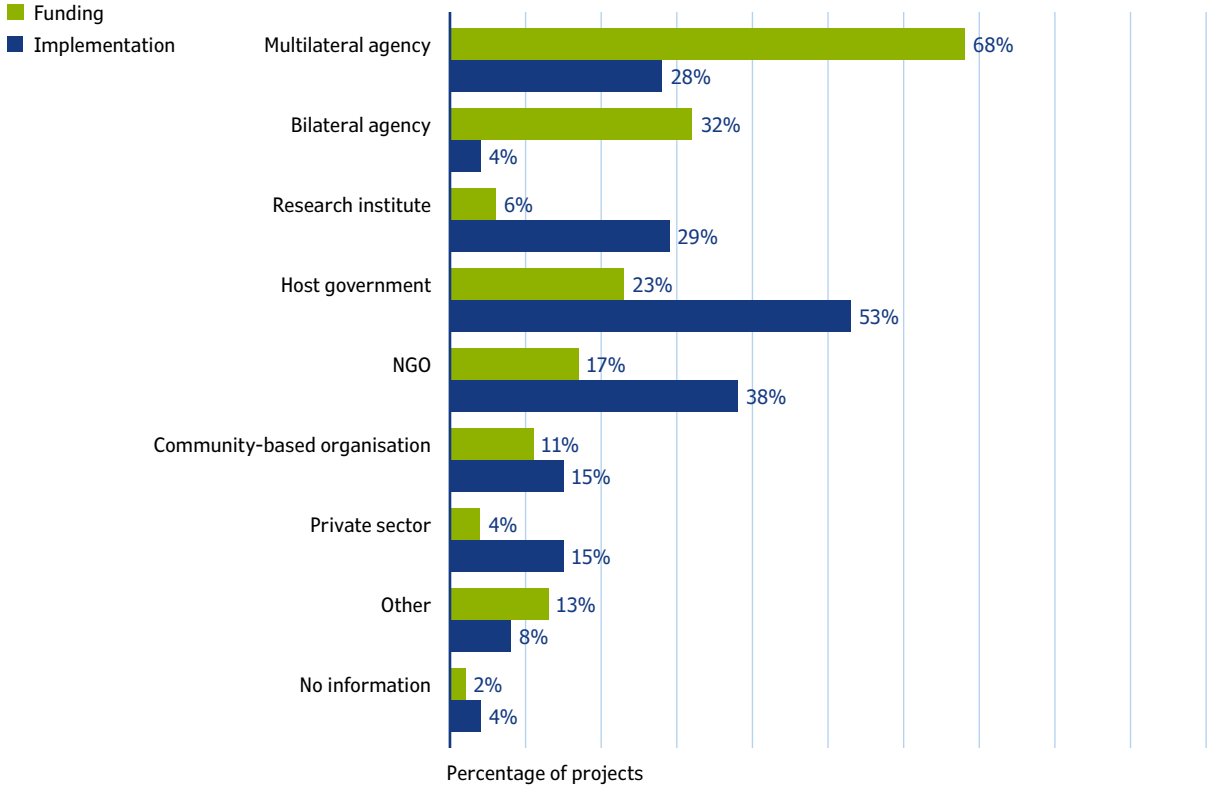
Figure 6: Components of FFS intervention

Inception
- Recruitment and season-long training of facilitators
- Curriculum developed partially by farmers
- Farmer group formation
- Other inputs: financial and monitoring systems

Farmer training
- Season-long training attended by farmers
- Facilitation through discovery-based group learning (e.g. agro-ecosystem analysis, experimentation, group dynamics, special topics)

Dissemination
- Field days, exchange visits
- Platform building (e.g. support to local networks)
- Training of farmer trainers

Figure 7: Organisations funding and implementing FFS projects



Farmer training

The standard FFS training involves a field-based, season-long programme overseen by an FFS facilitator, with weekly meetings near the plots of participating farmers. Each FFS typically has 20–25 participants, with farmers working together in groups of five. Facilitators are supposed to use experiential, participatory and learner-centred training methods,[34] designed to enable farmers to learn to make better decisions for themselves.[35]

More than half the project designs used agro-ecosystems analysis (AESA), a common component of FFS training that involves pictorial presentations of factors that affect crops.

FFS facilitation should ideally involve experimentation, comparing business-as-usual farmer practice in control plots with new practices based on FFS technology in demonstration plots. However, only one-quarter of the projects reported incorporating farmer practice plots alongside the experimental FFS plot.

Standard field school design activities also include group dynamics 'to strengthen group cohesion, maintain motivation and help participants develop organizational skills'.[36]

Dissemination

Many FFS projects include dissemination activities such as farmer exchange visits to other field schools (40 per cent), and field days focusing on specific local problems, providing farmers the opportunity to present course material and the results of their studies to their communities (60 per cent).

FFS projects may also attempt to promote diffusion to neighbouring non-participating farmers by encouraging FFS graduates to engage in informal farmer-to-farmer communication or through attempts at local institutionalisation. A third of projects provided platform-building activities, organising farmers' clubs or building local networks to encourage continued local collective action. Training of farmer trainers has also been used to support diffusion to the broader community.

Around half of programmes provided additional inputs such as seeds or tools and one-third offered complementary marketing training.

2.4 Who funds and implements FFS programmes and projects?

UN organisations with a special interest in agriculture have led the way in the expansion of FFS projects: 31 per cent of projects were funded by FAO and 19 per cent by IFAD. Figure 7 shows other organisations that have provided funding and been involved in project implementation. Host governments implemented over half the projects in the portfolio, followed by non-governmental organisations (NGOs) with 40 per cent. International research institutes with a specific interest in FFS projects have also played a significant role in project implementation or coordination. One example is the International Potato Center's programmes in Peru, Bolivia and Ecuador, which led the way in managing late blight and other diseases in potatoes.

How are farmer field schools supposed to work? The theory of change

3

Chapter highlights

- For FFS projects to work, key assumptions regarding the trainers, the farmers and the incentive environment are needed.
- FFS are multi-component interventions designed in different ways.
- A theory of change helps to clarify the intervention components and how a FFS is supposed to work.

FFS programmes aim to build farmers' capacity and promote the adoption of better practices, to improve agricultural outcomes, health, the environment and farmer empowerment.

Figure 8 illustrates our theory of change to achieve these outcomes. We developed this theory through an iterative process of how FFS projects are explained in project documents and issues that emerged from the data.[37]

The theory of change has the following main components:

1
Inception: Identify, recruit and train facilitators. Develop the curriculum.

2
Targeting: Establish targeting mechanisms. Form new groups or identify existing ones.

3
Farmer training: Farmers attend the sessions, which are run as planned by suitably qualified facilitators.

4
Dissemination: Promote community-wide diffusion to non-participant neighbour farmers.

5
Capacity building: Participants gain knowledge and other skills.

6
Adoption: Participants adopt the farming practices promoted through the FFS.

7
Diffusion: Non-participants become aware of new techniques through observation, word of mouth or formal diffusion activities, and so adopt these practices.

8
Impact: Higher yields, higher net farm income, improved health and environmental outcomes, and farmer empowerment through skills development, group activities and collective action.

9
Sustainability: Farmers are able to adapt to new challenges using the skills learned by participating in FFS.

Each step in the theory of change is based on assumptions, which are needed for the outcomes to be realised from the activities. These assumptions can be grouped into three categories: design; implementation; and context and local characteristics, which include those of the farmers themselves.

Design

The curriculum should be relevant to local needs. This requires FFS facilitators not to provide lectures, but to facilitate the learning process. It is assumed that this bottom-up participatory approach to learning, with a focus on helping farmers identify appropriate methods and build their problem-solving capabilities, ensures that they internalise the message through learning by doing.

Implementation

It is assumed that the target farmers know of the FFS programme and are willing and able to take part. To develop skills, farmers must attend sufficient meetings with a skilled facilitator over the planting season. To adopt the new techniques, farmers compare the benefits of new practices in experimental FFS plots with the conventional farming approaches on farmer practice plots. The techniques need to be appropriate to farmers' resources, including labour, and should improve yields and incomes.

For FFS to lead to improved knowledge and skills, facilitators should be adequately trained, involving season-long theoretical and practical training. It is vital that they – and traditional extension agents in particular – become familiar with, and adopt, a more participatory, learner-centred approach.

The theory of change assumes that farmers who are targeted and reached by FFS projects are willing and able to participate in training throughout the season and able to implement FFS practices in their own fields. The process of group formation, or using existing groups, should not conflict with these targeting objectives.

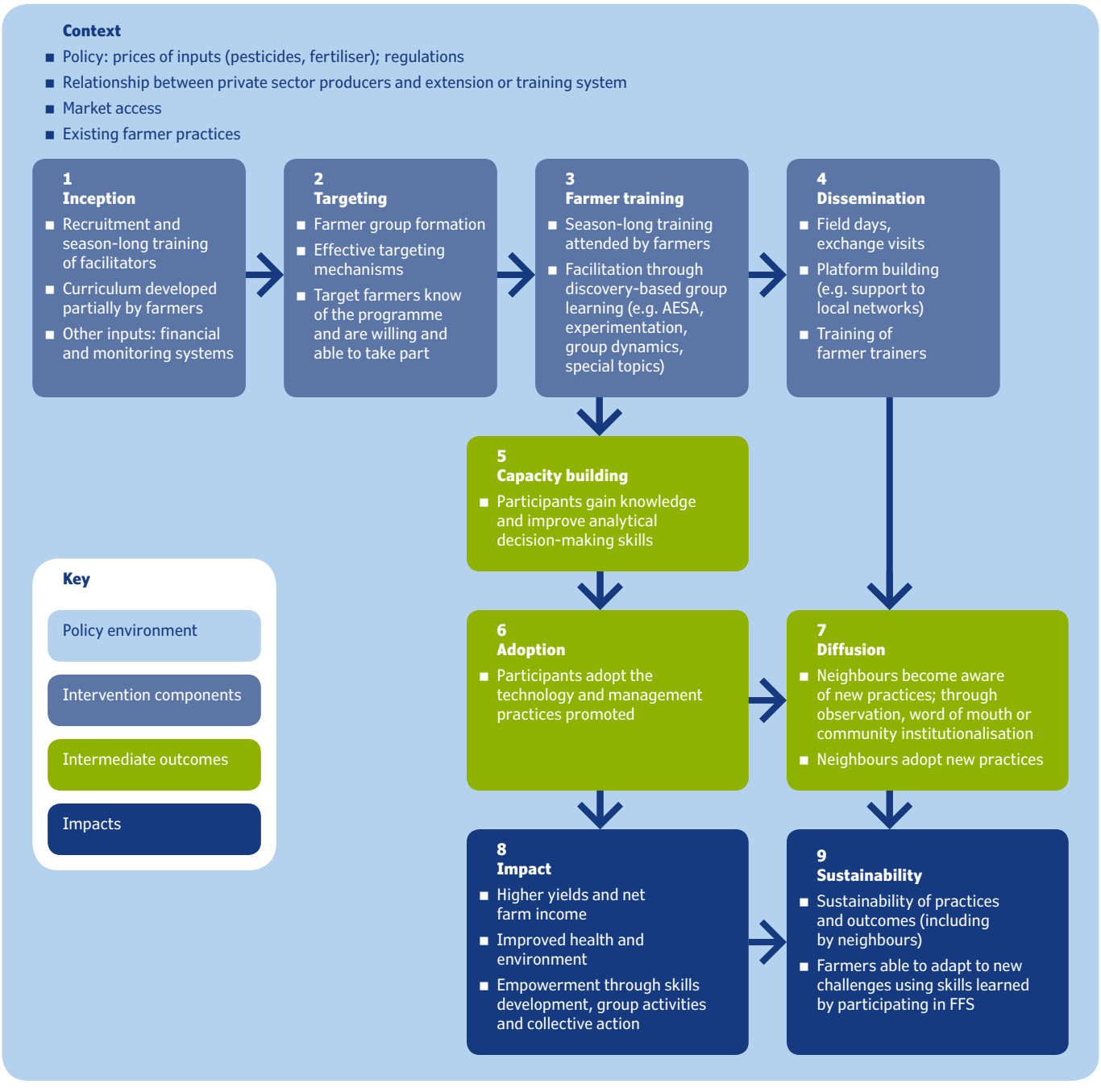
FAO community IPM guidelines focus on institutionalising IPM and point to the need for adopting formal approaches involving FFS alumni: 'without post-FFS educational opportunities, there will be no community movement'.[38] Whether a project has an informal or formal diffusion mechanism has implications for beneficiary targeting.[39] Without formal mechanisms, participants should ideally have characteristics which will enhance diffusion – such as being respected in their communities and having strong social networks. In the absence of formalised community building and training-of-trainers programmes for FFS alumni, the degree of diffusion of IPM knowledge and practices from participants to non-participants will depend on existing social networks.

Context and local characteristics

The policy environment affects a project's ability to have the desired impact. Since the majority of FFS projects promote the proper use of pesticides and fertiliser, it is important that prices and interactions between private sector producers and public sector extension workers do not create adverse incentives. Where production is for the market, there should be reasonable market access.

For IPM to be sustainable, it has to be adopted by the whole community. This requires FFS participants to diffuse knowledge and practices to neighbouring farmers who are not able to participate in the field schools.[40]

Figure 8: FFS theory of change



Who benefits from farmer field schools? Targeting design and performance

4

Chapter highlights

- The majority of FFS projects have targeted better-off farmers, as they are more likely to benefit from and disseminate FFS approaches. But over half of the reviewed projects also targeted more disadvantaged groups.
- FFS projects commonly use categorical targeting (based, for example, on literacy levels or type of crop), often combined with an additional assessment.
- FFS succeeds in reaching better-off target groups. There has been mixed success in reaching disadvantaged populations.

Should FFS projects select experienced and educated farmers with productive assets, who may be best able to benefit? Or should they promote poverty reduction objectives and target poor farmers and priority groups such as women? Are the targeting mechanisms consistent with targeting objectives? This chapter presents evidence on how FFS projects have targeted farmers and whether they succeeded in reaching the intended beneficiaries.

4.1 Approaches to targeting

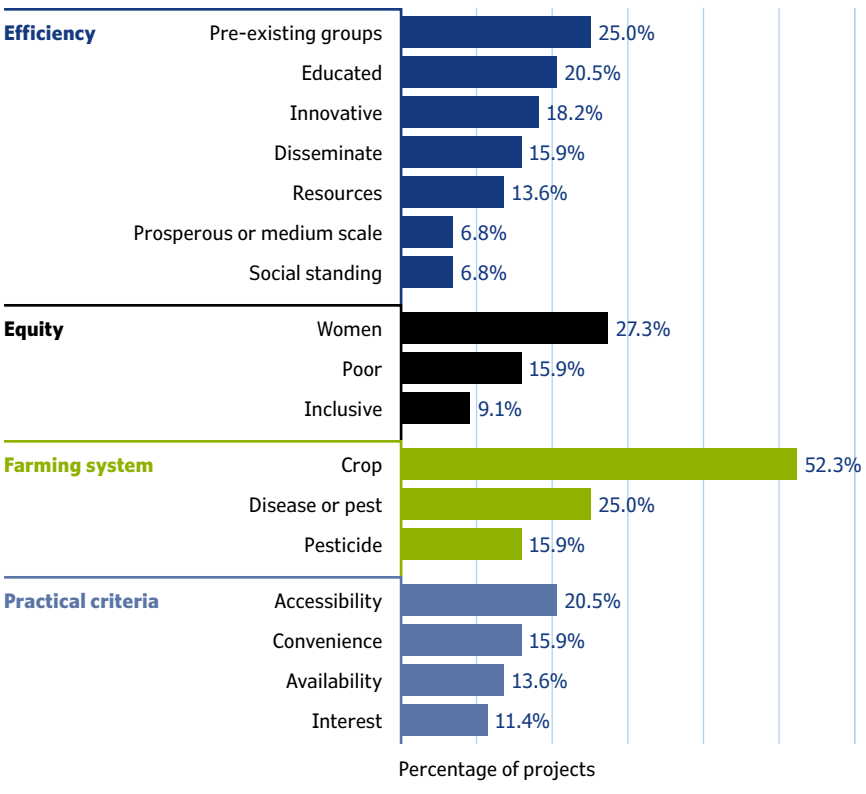
Figure 9 shows the four main types of targeting criteria used in FFS projects:

1
Efficiency: Many projects targeted farmers who were best able to make use of the training – a quarter targeted members of existing farmer groups while 85 per cent focused on farmers with other desired characteristics. For example, Cambodia's national IPM programme was among the 7 per cent of projects that targeted more prosperous farmers or those with high social standing. The IPM programme in Indonesia, on the other hand, targeted literate farmers since it was assumed that they would best learn and diffuse the FFS knowledge.

2
Equity: 55 per cent of programmes targeted marginal or poorer groups. Over a quarter of programmes – such as Nepal's and Ghana's national IPM programmes – explicitly targeted women, while 15 per cent, including Zimbabwe's AFFOREST (African Farmers' Organic Research and Training) FFS, directly targeted the poor. A further 10 per cent of programmes were designed to include all farmers – for example, the Lipton Tea-Kenya Tea Development Agency FFS included different farm sizes.

Figure 9: Criteria used to target FFS farmers

Note: Percentages add up to more than 100 per cent due to programmes implementing multiple targeting criteria.



3
Farming systems: 95 per cent of programmes targeted farmers of particular crops, those experiencing pest or crop disease problems, or those who were over-reliant on chemical pesticides. A quarter of programmes, including the Striga Control Programme in Nigeria, targeted farmers who were over-reliant on chemical pesticides, and 16 per cent, such as the FAO-EU IPM Programme for Cotton in Asia, targeted high pesticide use areas. The single most common targeting criterion was that farmers should be growing a particular crop – most commonly rice, but also often other staples. The IPM Collaborative Research Support Project in Ecuador, for example, targeted farmers for whom potatoes were a principle crop.

4
Practical criteria: Many programmes also included practical criteria based on the motivation (11 per cent) and availability (14 per cent) of farmers; convenience to implementing agencies (16 per cent); and accessibility (21 per cent) of farmers' locations. One programme in Bangladesh was implemented in areas where the NGO Care International already had ongoing operations, while the FFS for IPM programme in Sri Lanka targeted areas that were accessible to FFS facilitators.

Targeting mechanisms are approaches that make the targeting criteria operational. Figure 10 illustrates the three broad types of targeting mechanisms for which data is available from 58 projects:[41]

1
Individual or household assessment selects participants, either using a means test or according to explicit criteria set by community leaders or programme implementers. This mechanism was used in just under half of the projects.

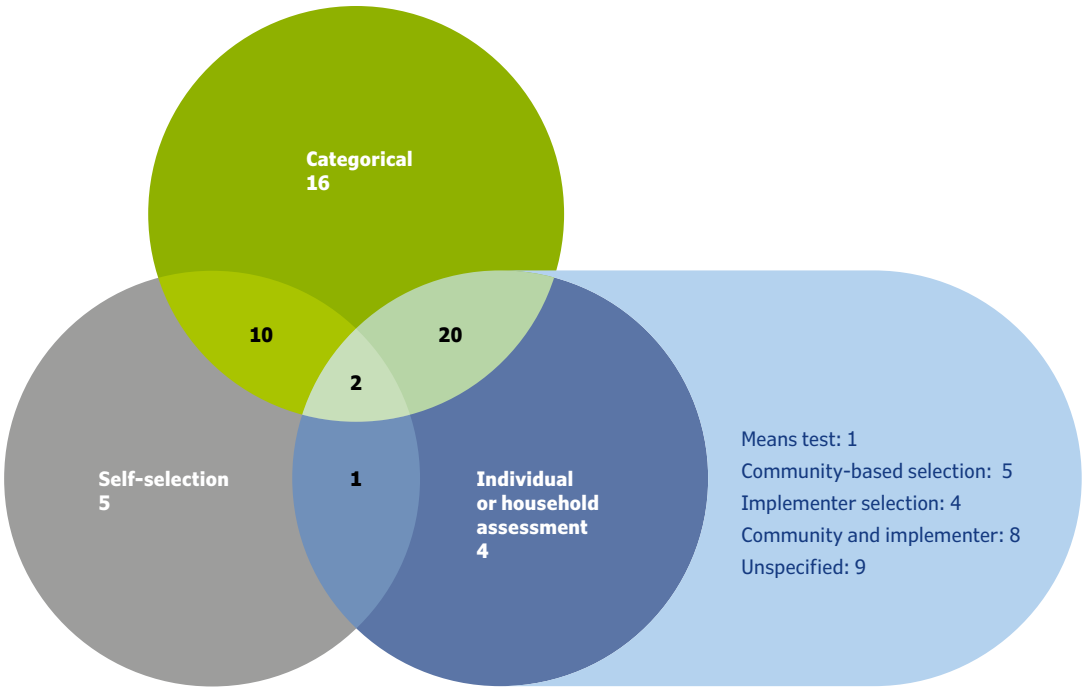
2
Categorical targeting uses easily identifiable criteria at either individual or household level – such as sex, age, land ownership, farmer group membership – or at community level – including specific locations, or areas with pest or pesticide problems. Categorical targeting is the most common approach, used by 83 per cent of the projects.

3
Self-selection occurs where a programme is universally available, and was used in just under one-third of the projects.

Targeting mechanisms are typically used in combination: 22 of the 48 projects that used categorical targeting combined it with assessment, typically using a two-step procedure for identifying potential participants. Categorical targeting was followed by individual or household assessment or self-selection.

Assessments were usually through community- or implementer-based selection, rather than a formal means test. For example, the Cambodian national IPM programme used categorical targeting of rice farmers, then asked the host NGO to select numerate and literate FFS participants in collaboration with village leaders.

Figure 10: Targeting mechanisms used in FFS projects



4.2
Effectiveness of targeting

FFS participants are disproportionately better-educated and more likely to live nearer roads and be members of an agricultural association.

The mean years of schooling of FFS participants is 6.8 years, compared to 6.4 years for non-participant neighbours and 5.7 years for those in comparison communities. The few studies that provided information about local amenities showed that FFS participants lived, on average, 0.3 kilometre from the road compared to 0.5 kilometre for their neighbours, and 41 per cent were members of agricultural associations, compared to just 13 per cent of non-FFS neighbours.[42] Men were slightly more likely to participate than women; 33.9 per cent of FFS participants were female, compared to 37 per cent of their matched, non-participating neighbours.

FFS projects do not reach the poorest farmers, partly because many programmes' inclusion criteria target better-off, literate farmers, or those with access to land. For example, the FFS programme in Bangladesh targeted smallholders; Ecuador's Ecosalud FFS programme specified that participants must have some access to land;[43] Cambodia's national IPM programme targeted farmers who were literate and numerate; and Indonesia's national IPM programme targeted those who could read and write, attend training regularly and disseminate what is learned to others.[44]

But even when FFS programmes target the less well-off, the process may exclude them in the end. While some pro-poor programmes successfully targeted resource-poor or socially marginalised groups, in other cases these groups were excluded;[45] in particular, women, people without access to land (such as day labourers), the poorest farmers, illiterate and uneducated farmers, young people and those in poor health. For example, in Uganda, although selection was intended to be open to all, in practice community leaders' involvement in the recruitment process meant that ultimately most participants had social connections to them or belonged to pre-existing community groups.[46]

Even where community members played no part in participant selection, social elites or organised community groups were still able to monopolise FFS places. In some cases, attendance requirements excluded the poor. In Peru, for example, existing social networks[47] and farmer groups[48] dominated the selection process to the detriment of poorer or middle-income farmers. Low economic and social capital was also a factor across projects. The lack of access to tools and land, an inability to accept the opportunity costs of participation and a lack of social power all prevented farmers from participating in projects.

Other pro-poor programmes were more successful in their targeting. Zimbabwe's AFFOREST FFS programme was designed to reach resource-poor farmers. The original programme design was for community members to choose participants, but implementers observed that selection by peers was leading to nepotism. They took over the selection process, with the result that the majority of FFS farmers were from the resource-poor target group.[49]

4.3 Targeting women

Although women make up an average of 43 per cent of the agricultural labour force in developing countries (50 per cent in Africa), they often have far less access than men to productive resources and opportunities.[50] Many FFS projects explicitly identified women as a target group. However, the targeting process often worked against their inclusion, for various reasons.

Where FFS selection relied on community-based targeting or implementer selection, women were sometimes excluded from participation. For example, in the Indonesian national programme, the selection procedure led to women being overlooked or excluded.[51] In Kenya, female-headed households were simply not represented at the village meeting that selected programme participants.[52]

Some women were effectively precluded from taking part because they did not fulfil the basic inclusion criteria. For example, women in Bangladesh[53] and Cambodia[54] did not have sufficient influence or education; they lacked access to land in Zimbabwe[55] and Liberia;[56] or were not members of an existing group in Kenya[57] and Indonesia.[58] In Bangladesh, Cambodia and Indonesia, widows and others from female-headed households were particularly likely to be excluded.

In Zimbabwe[59] and Liberia,[60] women's involvement was limited by a lack of tools or access to land, while time commitments to the household and childcare prevented women in Liberia, Kenya[61] and Ecuador[62] from taking part. In other cases, women failed to gain their husbands' permission to participate in FFS projects.

The Cambodian national IPM programme and some FFS projects in India[63] successfully targeted female farmers; this was ascribed by the study's authors in part to the fact that implementers proactively encouraged female participation.

4.4 Summary

While efficiency targeting of better-off farmers appears to have been successful, equity targeting (programmes designed to be inclusive of, or aimed solely at, the poor) did not always successfully reach target groups. This was either because targeting mechanisms favoured elites or because target groups' characteristics made it difficult for them to participate. Notably, programmes had mixed success in reaching women.

Barriers to effective targeting include inappropriate selection criteria and targeting procedures and structural barriers to participation such as sex, poverty and cultural norms. Without a considered approach to targeting, farmers may end up participating for inappropriate reasons and ultimately dropping out. Alternatively, participants may not have sufficient education levels or access to land and resources (including time) to be able to attend the full training and implement the practices learned.

How are farmer field schools implemented?

5

Chapter highlights

Each stage of FFS implementation faces challenges, including:

- An incentive environment which discourages the adoption of practices promoted by FFS.
- Curricula that are insufficiently adapted to local needs.
- Facilitators who are not trained, or able, to deliver experiential learning effectively.
- Lack of support for dissemination activities.

This chapter presents evidence on how FFS projects have been implemented in practice.[64] Unfortunately, for many projects there is no documentation on how they worked when they worked well. The focus tends to be on when projects did not go to plan. This evidence does not indicate problems found in all FFS projects; rather, in those that have arisen in some cases. Policymakers and practitioners must watch for these issues when designing and managing FFS projects. Here, we examine how the theory of change has worked in practice.

5.1 Context and policy environment

In some cases, other programmes, donors and private companies can subvert the successful implementation of FFS programmes. Here are some examples:

- A presidential decree in Indonesia committed the government to IPM as a national pest control strategy, removing subsidies and banning many pesticides. However, local village cooperatives continued to operate subsidised credit schemes that obliged farmers to purchase technology packages, which contained pesticides;
- In Uganda, donors alone determined which programme technologies would be promoted. The failure to involve local stakeholders in the decision making meant that FFS implementation favoured a top-down promotion of technologies over more participatory, discovery-based problem solving that was adapted to local needs; and
- In Indonesia and India, village extension workers acted as intermediaries between pesticide companies and farmers. Some extension workers promoted the heavy use of pesticides because they received commissions for these input sales.

5.2 Project inputs and site selection

Projects in Indonesia, Kenya and Tanzania encountered problems due to shortfalls or delays in funding, a lack of other resources and logistical problems. For example, in Tanzania, there was insufficient provision of farm tools, fertilisers and improved varieties of seeds, or delivery of these items was delayed. In some cases, they did not reach the FFS sites at all.

Inappropriate site selection has been an impediment to some IPM FFS projects. For example, the demonstration plot in a Kenyan FFS was on a remote site with limited irrigation and poor soil fertility, limiting the crops farmers could grow and the farming practices they could use.

5.3 Curriculum development and group formation

Project inception usually includes developing a curriculum, forming farmer groups and training trainers for extension workers and other field school staff.

While FFS projects are oriented to a specific technology, they are also meant to include the local community in developing the learning process. Local involvement in curriculum development has helped ensure relevance. In India, reducing pesticide use met farmers' concerns about environmental degradation and pollution. In Zimbabwe, one FFS incorporated indigenous knowledge, increasing the sense of ownership and motivating farmers' learning.

Where the curricula were not sufficiently tailored to local needs and resources, farmers regarded this failure to incorporate a broader range of concerns as a weakness of the programme. For example, some programmes only gave advice suitable for areas with high growth potential, or promoted varieties of crop which local people were reluctant to eat on grounds of taste.

In other cases, FFS projects failed to address farmers' broader concerns. For instance, in Kenya, farmers were concerned about water availability, marketing and social factors impeding agricultural production, none of which the FFS covered. In India, farmers suggested that focusing on more than one crop, and adopting a broader systems approach, might have been better.

5.4
Training facilitators

Problems arise if facilitators are not suited to the job, are poorly trained or simply fail to turn up. Given the important role and participatory skills required, it is important to identify FFS facilitators and train them well. This is particularly the case if existing extension workers become FFS facilitators; they are likely to be in scaled-up programmes, and institutional inertia can support the continuation of old practices.

Facilitator training took place in 90 per cent of projects. But selecting facilitators solely on their levels of education does not necessarily identify suitable candidates for the job. Characteristics of successful trainers include: personal attitude, maturity, literacy, leadership skills and experience in farming. In Kenya, project implementers found that good leadership skills, rather than education levels, were important when selecting FFS facilitators. In Zimbabwe, where planners focused on high levels of education rather than attitude, maturity, literacy and farming experience, facilitators performed poorly.

Facilitators were less effective if they did not speak the same language as participants. In Bangladesh and Kenya, facilitators spoke the national, rather than local, language; this hampered farmers' participation and learning. In Indonesia, on the other hand, trainers using the local language enhanced farmers' understanding.

These problems were exacerbated when facilitator training did not focus on participatory techniques and facilitation skills. In Bangladesh and Cambodia, the training of trainers curriculum was too technical, and had little focus on developing participatory facilitation skills.

In other cases, the training provided was simply inadequate. In one FFS project in Uganda, there was only one training workshop. In Nicaragua, the training for facilitators did not cover marketing and commercialisation, despite these being part of the FFS curriculum. So, while the facilitators recognised the importance of these topics, they lacked the tools and technical expertise to facilitate sessions on these topics.

In Zimbabwe and the Philippines, insufficient financial incentives for facilitators meant they did not spend enough time at the field school and on farm visits.

5.5
Farmer training

A typical FFS project lasted for three years, with farmers attending field school for a single growing season. Most schools held weekly season-long sessions, although in a few cases of arable crops, meetings were fortnightly. In the case of tree crops, they were often held fortnightly over the course of several months, such as the tea FFS in Kenya and cocoa FFS in Ghana – or even years, as was the case for a coffee project in Ethiopia.

A participatory approach to training is central to FFS, and many projects report using this approach. Some – such as Ethiopia and China – adopted a top-down transfer of technology approach based on lecturing, while in Cambodia and Uganda facilitators led the experiments. It is not always clear how other projects trained farmers.

5.6
Farmer participation and attendance

Farmers are supposed to attend weekly classes over the course of a growing season in order to be able to internalise the FFS approach. However, FFS programmes have had significant problems with attendance and drop out. For example, around 25 per cent of initial FFS participants in Iloilo, the Philippines, dropped out before the programme was completed. In Ecuador's Ecosalud programme, just over half of the participants showed up for each session.

The most common reasons for low attendance and drop out were that participants did not receive anticipated loans, cash or payments in kind for their attendance.[65] In Zimbabwe, farmers joined because they were promised seed loans; they left once the loans stopped. Similarly, in Uganda there were reports of high levels of dropout, and despite a sensitisation process, some farmers 'still joined FFS groups primarily because of an interest in accessing external funds'.[66] In Kenya, many farmers dropped out or refrained from participating once they realised cash was not forthcoming.

The opportunity costs of FFS attendance can also be prohibitive for farmers. In around a third of the studies that examined reasons for participation – including Ecuador, Kenya, Liberia and Malawi – participants felt that the FFS sessions were too time-consuming or they had other commitments that made attending all sessions difficult.

Other reasons for low attendance and dropout included poor accessibility and low relevance of FFS sessions, weak programme implementation (including training approach) and problems retaining trainers.

5.7
Activities to support dissemination and diffusion

Only around 40 per cent of projects reported follow-up activities to foster inter-group learning across FFS projects and community dissemination, such as exchange visits and field days. In addition, only 30 per cent reported platform-building activities to ensure FFS sustainability, such as organising farmers' clubs or building local networks for continued collective action. More than 20 per cent of projects promoted diffusion through farmer trainers, where FFS graduates were encouraged to train and take a lead facilitation role.

In a number of projects (in Trinidad and Tobago, Nicaragua, Cambodia and Indonesia), the lack of technical assistance and back-stopping from agricultural researchers and extension workers prevented diffusion and failed to support farmers to continue developing local practices.

In other cases, implementers provided active follow-up and this continued support encouraged farmers to establish clubs; additional sessions on club formation facilitated the establishment of sustainable groups and practices. In Liberia, the implementing agency hoped that the FFS groups would develop into community-based organisations that would continue meeting and working together. However, the most successful group was the only one that received follow-up and support from the agency. In Bangladesh, FFS farmers were encouraged to establish farmer clubs, which continued to be supported by the implementing agency. Two studies from Kenya found there was no support for FFS-related follow-up activities. This meant that the sustainability of group activities depended on the willingness of public officials to serve on a voluntary basis, and on the capacities of the different FFS groups.

5.8
Summary

Overall, the design and implementation of the many projects identified as FFS ranged from participatory adult education programmes as promoted by the FAO, to top-down technology transfer approaches that are akin to agricultural extension. The selection and training of facilitators was crucial in determining the quality of FFS training. A minority of programmes used formal methods to institutionalise FFS at the community level through farmer clubs, and support activities to encourage sustainable adoption and diffusion. In the absence of formal activities to provide ongoing support, FFS training alone is unlikely to be sufficient to enable farmers to continue with FFS practices, deal with any new challenges and encourage others to do the same.

What difference do farmer field schools make?

6

Chapter highlights

- FFS participants improve their knowledge and change their practices, experiencing higher yields and net incomes as a result.
- This evidence comes from smaller scale pilots. The evidence from projects operating at scale shows no impact.
- The evidence base for farmer empowerment is weak.

What are the effects of FFS projects on farmers' well-being? What explains the differences in effects across different contexts? And are the effects sustainable and scalable?[67]

6.1 Knowledge and empowerment

Participating in FFS improves farmers' knowledge of farming technology. Figure 11 shows that knowledge outcomes improve for all FFS curricula, and for IPM FFS graduates in particular. Participants had, on average, 41 per cent more knowledge.[68] This is based on potato farmers in Peru and rice farmers in Viet Nam who showed increased knowledge of different IPM practices, and cotton farmers in Pakistan who were better able to differentiate between beneficial and harmful pests.[69]

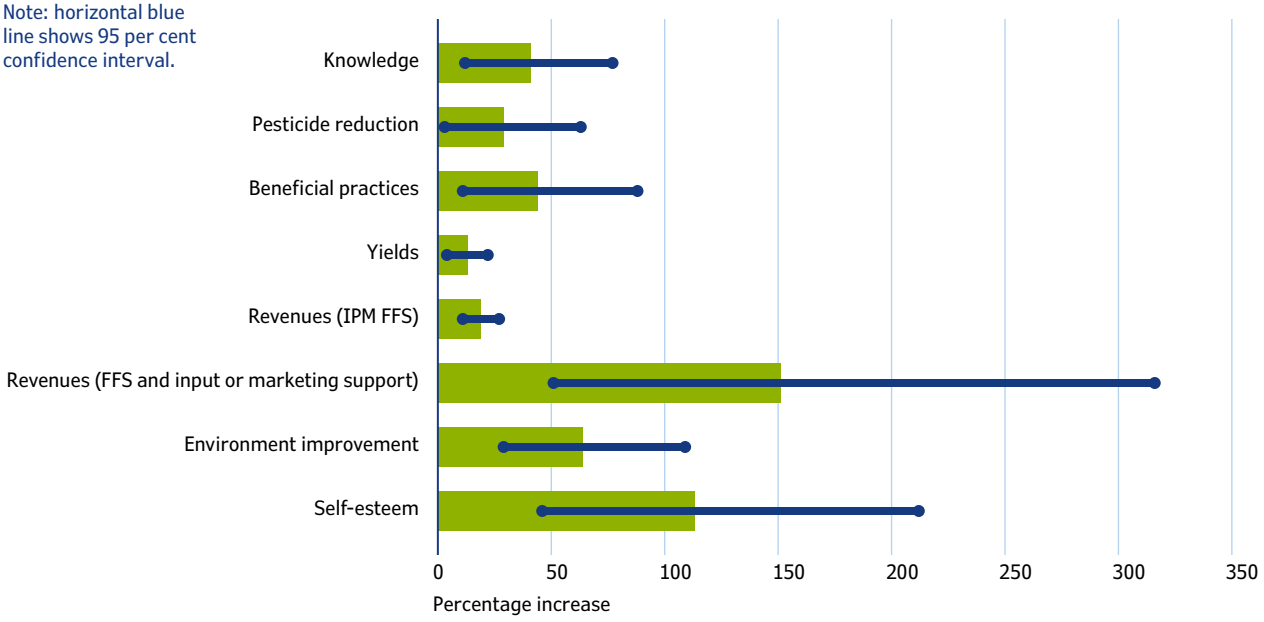
There is only quantitative evidence from one project, a coffee project in Peru, regarding farmers' problem-solving capabilities – participants in that field school felt more confident with problem solving and interacting with the community.[70] However, qualitative evidence from India and Zimbabwe also reported farmers saying that participating in the projects improved their decision-making skills.

Qualitative evidence from Cambodia, India, Indonesia, Kenya, Liberia, Uganda, Zimbabwe, Peru, and Trinidad and Tobago supports the view that participation in FFS increases empowerment, with participants reporting increased self-confidence.[71] However, this evidence is mostly from smaller scale projects, and while the Indonesian data is from participants in the national IPM programme, the study findings are all from one location. None of the studies of these particular projects used a comparison group.

FFS participants in India and Kenya also reported having stronger social ties, improved collaboration and more collective action.[72] Graduates said they had acquired enhanced status within their community: in Kenya they were treated with more respect; they adopted leadership roles in Uganda and Kenya; while in Indonesia they were seen as IPM experts.[73]

Figure 11: Summary meta-analysis findings for FFS participants

Note: horizontal blue line shows 95 per cent confidence interval.



The IFAD-FAO IPM programme established a group composition and atmosphere that helped breach traditional community roles and relationships, ultimately improving gender relations.[74] Women in Bangladesh, India and Kenya also reported increased self-confidence in their interactions in the community,[75] but other studies from Kenya and Bangladesh suggest that traditional gender roles within the household remained the same.[76]

The FFS theory of change is that adopting more participatory approaches in adult education programmes based on dialogical learning helps farmers to develop skills and capacity. They are less likely to internalise messages delivered through a top-down 'chalk and talk' approach. However, there is insufficient evidence to support or refute the notion that this factor affects capacity development one way or the other.

6.2 Adoption of new practices

FFS participants in IPM projects in China, the Philippines and Pakistan used 23 per cent less pesticide than neighbouring non-participants (see Figure 11).[77] Studies of these projects also reported an increase in other beneficial practices, including IPM in Pakistan, participatory forest management practices in Ethiopia and ICM practices in Peru.[78] However, these positive effects were strongest for cotton crops in Asia, and for pilot projects or effects measured over shorter periods. There was no evidence of impact from longer-term studies of scaled-up programmes, as in national IPM programmes in Viet Nam and Indonesia (see box, opposite).[79]

In this section we discuss various factors that help explain the success or failure in adopting new farming practices taught in FFS.

Conflicting agricultural policies

Subsidised input schemes, trickle-down messages and off-the-shelf technology promotion can counteract the efforts of FFS projects. In Thailand, a change of leadership in the Department for Agricultural Extension reversed priorities towards pesticide-based crop protection after a period of high-level support for FFS.[80]

Conflicting messages

Other institutions may be promoting conflicting messages. In Uganda and Cambodia, the national governments were 'disconnected from the IPM-FFS initiative, acting only as a "rubber stamp" for international aid organisation decisions'.[81] In other cases, it is clear that the institutional legacy of traditional agricultural extension can inhibit participatory FFS practices, as has been suggested in Uganda, India and Indonesia.

Box 2:
The Indonesia national FFS programme: results from study replication

The Indonesian IPM FFS programme was the first long-term, scaled-up FFS programme to be rigorously evaluated. But there is a debate over the impact of this programme: two studies using the same data and largely the same methods reached different conclusions regarding agricultural outcomes.[82] One study examined impact by time and duration of exposure, finding positive short-term effects on rice yields, but neither study found any significant impact on adoption of new farming practices.

So why did the studies not find convincing positive effects in the Indonesian FFS programme? One study suggests that spillovers may have biased impact estimates downwards, given the close proximity of some non-FFS comparison villages.[83] But the lack of support for diffusion in general, confirmed in 3ie's systematic review, undermines this argument. Perhaps sample selection bias was a problem since, although the data drew on random sample agricultural household survey data, it is not clear to what extent the sampling frame was representative of the FFS farmer population. Others have suggested that additional yield gains in technologically advanced rice production systems might be small and difficult to measure by recall surveys,[84] although again this is a problem which would affect other impact evaluations reviewed as part of this study.

Other factors impeding effectiveness in Indonesia included problems in scaling up implementation nationally, and broader structural issues facing agriculture. For example, there were problems in ensuring the quality control of FFS facilitators, given that many in the scaled-up programme were experienced extension workers who had initially been trained to use top-down methods. There were also problems in ensuring regular supplies of funds and materials to field staff. It may have simply been difficult to achieve yield gains in a context of falling yields due to declining soil fertility, increasing plant diseases and negative climatic trends.

Conflicting incentives for facilitators

The power of the pesticide industry and its continued links with the extension system can also act as a barrier to adoption. In Indonesia, extension workers and local cooperatives continued to act as local intermediaries in input distribution, with some continuing to promote pesticides.[85] In China, plant protection stations started selling pesticide to make up for a shortage in operation funds.

Lack of access to complementary inputs

A lack of access to the complementary inputs needed to adopt FFS practices, such as labour time, are common challenges for farmers. These are not specific to FFS programmes, although they have prevented some farmers from fully adopting FFS practices. In Bangladesh and Kenya, FFS participants reported a lack of access to capital, while in India they were constrained by input availability in the market. In Kenya, farmers said they were able to tend to group plots, but lacked the necessary labour for individual farms. In Thailand, farmers with more farm area per household member were also more likely to drop out of field school training due to labour shortages and high opportunity costs of labour.[86]

Lack of social cohesion

Existing farmer groups and a tradition of collective action in Trinidad and Tobago, Nicaragua and the Philippines encouraged participation in FFS and a willingness to learn and succeed with the training. On average, projects that facilitated group formation were successful in reducing pesticide use (28 per cent reduction), whereas those that did not reported no impact on adoption of pesticide use practices.[87]

Complexity

The complexity of the IPM curriculum made it difficult for some farmers to implement all practices on their crops. Participating farmers either perceived some of the analytical tools as taking too much time, energy and resources, or these tools were not communicated in a way that farmers understood. For example, farmers found that using forms to record field sampling with formulae to calculate percentages for damages and prevalence of insects to be of little practical use; they abandoned this approach in favour of simply recording what they observed in their fields.[88]

Lack of observability

Observability is important to build trust in the new technology and encourage farmers to adopt the practices promoted in FFS projects. In Indonesia, participating farmers feared that insects would spread from neighbouring fields, but experimentation and observation changed their views. Farmers also observed that their yields remained the same if they did not spray pesticides.[89]

Where facilitators did not demonstrate observable benefits, however, farmers were less likely to adopt FFS practices. When trials found higher revenues or yields in the IPM plot relative to the conventional plot, farmers were more likely to adopt the IPM practices included in the curriculum.

The technology does not work

There were times when the technology simply did not work. In a Nicaraguan project, 13 NGOs implemented FFS projects: five did not include an experimental non-IPM conventional plot, and of the eight that did, half obtained lower yields in the IPM plot and six gave lower profits. Pesticide use did not change here. In Trinidad and Tobago, the FFS did not generate sufficient results to convince farmers of the relative advantage of IPM.

6.3 Impacts and sustainability

As illustrated in Figure 11, participation in FFS increased yields by 13 per cent on average and net revenues (profits per unit of land) by 19 per cent. Projects in Africa, Asia and Latin America reported positive impacts. The impact on net revenues was greater than yields because input costs also fell as farmers used less pesticide. These effects were found in IPM field schools in China and Pakistan, IPPM schools in Kenya and Tanzania, and field schools promoting other curricula in Ethiopia.[90]

The effects on net revenues were particularly strong for field schools covering cash crops which also provided complementary inputs and/or marking components, such as the Plataformas programme linking potato farmers with agribusiness in Ecuador and coffee producers to international markets in Peru.[91]

Reducing pesticide use resulted in a 39 per cent average reduction in the environmental impact quotient, an indirect measure of human and environmental costs based on estimates of pesticide use.[92] Beneficial effects on the quotient were found in projects in Pakistan, Thailand and Ecuador.[93]

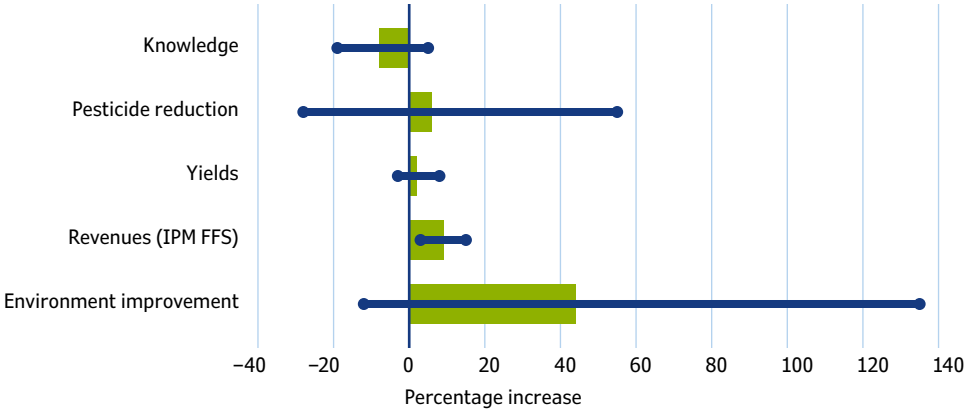
There was no reliable evidence on health outcomes resulting from lower pesticide use.

Positive impacts on agricultural outcomes were generally found in the short run – that is, two years or less after a FFS was implemented – and for relatively small-scale projects. For larger programmes implemented at national scale over longer periods, there is no evidence of positive effects. The only two national IPM programmes that have been evaluated (in Indonesia and Viet Nam) found no significant positive impact (see box on page 18), because adoption was not sustained.

In Indonesia, there were concerns about facilitators' experience in farming or extension, and about their ability to balance facilitation and leadership.[94] Inadequate follow-up constrained farmers' willingness to continue practising IPM, particularly when the rest of the community continued standard pest management practices. Farmers reported a lack of 'consistent support to back up their struggles in creating and maintaining the new schemas of interpretations and practices' in the face of pest outbreaks and continuing recommendations to use pesticides.[95]

Figure 12: Summary meta-analysis findings for IPM FFS neighbours

Note: horizontal blue line shows 95 per cent confidence interval.



Important factors for the sustainability of FFS groups following graduation include: consistent membership participation,[96] leadership,[97] collective goals and activities[98] and group support and validation, including back-stopping from researchers and extension workers.[99] All of these help to build graduates' confidence in FFS practices.[100]

One group in Cambodia found that reimbursing participants for FFS attendance may have undermined the sustainability of FFS groups, given that payments stopped once the project ended.[101] However, in seven other projects unfulfilled payment expectations prevented farmers from attending FFS.

6.4 Diffusion of integrated pest management practices

The evidence suggests that diffusion does not happen; there was no improvement in IPM knowledge among neighbouring, non-participating farmers. Figure 12 shows that non-participating farmers did not adopt new agricultural practices or report any change in pesticide use. No increase in yields or income was reported, either. This was true for both kinds of projects: those that supported diffusion through processes, such as community institutionalisation in India and Pakistan and training of farmer trainers in Indonesia and China, or those that left diffusion to happen by word of mouth and observation, as in Nicaragua.[102]

Several characteristics of FFS projects explain why the practices they promote do not diffuse to farmers who have not participated in training. The experience-based nature of FFS learning acts as a barrier to diffusion. Even where there is high awareness of IPM among non-participants, it is difficult to convey through verbal communication.

In Indonesia, despite trained farmers teaching their neighbours about IPM during pest outbreaks, the ideas were not properly explained or understood. In India, non-participants did not have the confidence to implement the new practices they had heard about from their neighbouring FFS graduates.[103]

In China and Pakistan, there has been diffusion of simple practices such as reduced pesticide use and improved yields among cotton growers, where field schools were able to target relatively well educated farmers. Evidence from Bangladesh supports this.[104] However, the same projects found that any initial adoption among neighbouring farmers in the short term falls considerably over time.

Community cohesion may also influence the diffusion of FFS knowledge and practices. In Cameroon and Cambodia, low levels of social cohesion limited communication within the community. In Indonesia, socio-economic differences between FFS participants and non-participants impeded diffusion. In the Philippines, however, high levels of social capital, particularly among farmers with kinship ties, facilitated the sharing of IPM concepts with non-participants.[105]

Targeting more educated farmers as early adopters is a strategy that may backfire when it comes to diffusion. FFS participants in one Indonesian study communicated to a 'selective audience in the villages' and made no deliberate efforts to train other members of the community in IPM principles.[106] However, another study from Indonesia found that a few inquisitive farmers played a prominent role in the ongoing process of knowledge formulation and transmission. These farmers progressively established their position within the community as 'experts', 'farmer professors' and 'consultants'.[107] This suggests that, while some spontaneous diffusion may be possible, there is a need for careful targeting of farmers with the appropriate characteristics. The Indonesia programme recruited literate farmers through a community implementer-based process.

Observability is important for convincing non-FFS farmers to adopt FFS practices. This needs to take place on the plot, so that non-participant producers can see what is done, since trained farmers may not have the time or skills to teach them. Observing the successful harvests of FFS farmers in projects in Cameroon, Kenya and the Philippines triggered interest and requests for advice from non-participants.[108]

In Honduras and Kenya, non-participating farmers perceived FFS practices as having a relative advantage compared to existing practices, which led to more interest in IPM. In Cambodia, however, the results observable in IPM farmers' plots were less convincing and, hence, non-IPM farmers were not persuaded of the benefits of IPM.[109]

A final reason for the lack of diffusion can be that too few farmers are being trained in each village to reach the necessary critical mass for community-wide adoption to take place. Training a small number of farmers in each village to maximise geographical coverage is unlikely to be the best strategy to achieve maximum impact. A more gradual approach to scaling up programmes across villages may be more successful.[110] A study of vegetable IPPM in Senegal provided evidence supporting a gradual approach to scale-up.[111]

6.5 Understanding programme failure

Where interventions fail, it can be useful to think of the funnel of attrition,[112] whereby potential beneficiaries drop out at various stages in the causal chain (see Figure 13). Critical points in the FFS causal chain include:

- Planned or *de facto* targeting mechanisms, including group formation, which exclude women and vulnerable groups even if they are targeted by the project;
- Drop out and non-attendance on account of poor training; failure to demonstrate the value of the technique being promoted; and lack of complementary inputs;
- Failure of non-participants to benefit in nearly all cases, even when platforms are created to facilitate this diffusion; and
- Most importantly, the difficulty of identifying and training suitable facilitators on the scale necessary to move beyond pilot programmes.

6.6 Summary

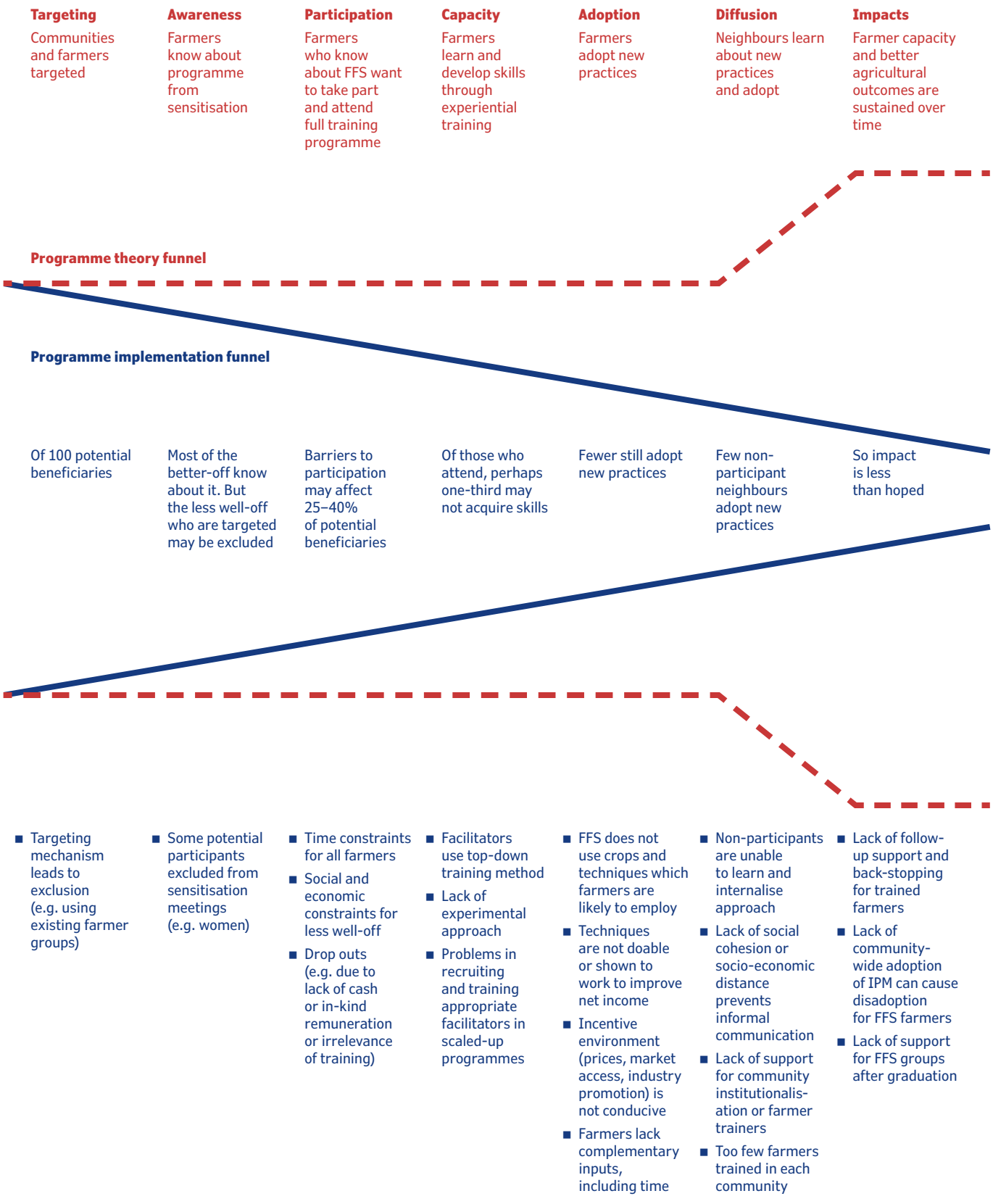
FFS projects are effective in improving intermediate and final outcomes for participating farmers. These beneficial impacts have been recorded across the different types of field school curricula. Impacts on agricultural outcomes are large: a 13 per cent increase in yields and 19 per cent increase in profits per unit of land. The latter was particularly large when FFS projects were implemented alongside complementary upstream or downstream interventions, such as access to seeds and other inputs and assistance in marketing cash crops.

However, these positive impacts were only found in smaller scale programmes. The two evaluations of national programmes found no impact on agricultural outcomes.

There is no convincing evidence that IPM field schools offer sustained diffusion to neighbouring farmers who live in the same communities as field school graduates. This lack of diffusion is an important weakness of FFS implementation approaches thus far.

There is little quantitative evidence regarding achievements in farmer empowerment objectives, though some qualitative studies do report positive impacts.

Figure 13: FFS funnel of attrition



Are farmer field schools cost-effective?

7

Chapter highlights

- FFS has a high cost per farmer compared to other means of communicating with farmers.
- Agricultural benefits have only been achieved in small-scale programmes, and the evidence for other benefits is weak.
- FFS is unlikely to be cost-effective at scale.

This chapter reports evidence collected on unit costs of FFS projects and estimates of cost-effectiveness reported in studies included in the review of effectiveness.

7.1 How much do FFS projects cost?

The full costs of an FFS include: fixed project management costs; start-up costs for facilitator training and curriculum development; recurrent costs of establishing and running field schools, field days and supervising back-stopping for facilitators; and follow-up costs relating to community institutionalisation.[113] Most FFS projects cost US$20–40 per participant. Average costs are higher (US$56), as there are a few programmes with much higher *per capita* costs.[114]

These do not include the costs to beneficiaries of attending field schools and implementing labour-intensive practices, which also need to be taken into account in any cost-benefit analysis.

These unit costs are relatively high compared to other programme approaches. For example, simple comparisons for potato IPM in Bolivia indicate that costs per farmer are: US$76 for FFS; US$26 for community workshops; and less than US$1 for radio spots on agricultural methods.[115] However, these are merely estimates of the costs per farmer trained; a proper comparison needs to take benefits into account.

7.2 FFS cost-benefit analysis

A favourable benefit-cost ratio (BCR) for FFS depends on the number of participants who are sustained adopters, the number of non-participants who are sustained adopters and the size of the net benefit from adoption.

Given the relatively high *per capita* costs of FFS, diffusion can be an important factor in helping projects to achieve a positive rate of return.

In India, a favourable BCR is achieved after just one year with an adoption rate of 90 per cent, but if adoption is only 30 per cent, then it needs to be sustained for at least three years for the benefits to outweigh the costs (see Table 1).[116] For Pakistan, these figures are 40 per cent and 15 per cent, respectively, as the net benefits from adoption are higher than in India. In China, where training costs are high and benefits limited by the small size of farms, the BCR is not favourable after one year. The ratio does become favourable after three years, but only with a very high adoption rate of 90 per cent.[117]

How do these figures compare with other interventions? A comparison in Bangladesh suggests that, while FFS has higher benefits than other programmes, its higher costs mean that the BCR is lower.[118] For simple practices (picking pests off vegetables), field days have a higher BCR than FFS. For intermediate practices (natural fertiliser and bait traps), the net benefits of FFS are negative, but positive for field days. FFS net benefits are positive for complex practices (plant grafting), but less than those for extension agent visits.

FFS's relatively low BCR compared to other approaches may be countered by two arguments. First, that FFS supports diffusion, so the number of actual beneficiaries exceeds the number of participants. Second, that FFS has other benefits – such as health and empowerment – which also need to be taken into account.[119]

Table 1: Benefit-cost ratio (BCR) estimates for IPM FFS programmes

	Bangladesh*	China**	India**	Pakistan**
Simple practices	3.92	—	—	—
Intermediate practices	0.92	—	—	—
Complex practices	6.8	—	—	—
All practices	—	0.42	1.29	2.73

Note:
BCR>1 indicates net benefit
BCR<1 indicates net loss

Sources:
* Ricker-Gilbert *et al.* (2008)
** Pananurak (2010)

The evidence, however does not support the argument that FFS achieves high levels of diffusion to other farmers, falling as it does at the first hurdle in the causal chain of increase in knowledge. And there is too little evidence to support the argument that the other benefits of FFS justify the costs. Hence, even if FFS projects are effective on a small scale, they may not be cost-effective.

What are the alternatives for disseminating technology to farmers? The evidence on top-down agricultural extension does not suggest it has been effective.[120] But given the particularly high *per capita* costs of FFS, the available evidence on effectiveness does not suggest that public extension agencies should throw their current institutional set-ups and dissemination methods on the scrapheap in favour of a nationwide FFS roll-out. A more promising solution would be to experiment with different methods of technology diffusion and evaluate how to improve them. A number of recently completed and ongoing impact evaluations are attempting to answer this question.[121]

Given that the stated objectives of many FFS projects include empowering farmers to develop lifelong skills, it may be more appropriate to implement FFS in place of vocational training or community empowerment programmes. Junior Farmer Field and Life Schools are being implemented in at least 12 countries to 'empower vulnerable youth'.[122] Common approaches for rural empowerment include community-driven development (CDD) schemes such as social funds, which also do not have a strong track record in improving empowerment outcomes.[123] However, more evidence is needed on the empowerment effects of FFS.

Part of the answer also lies in whether the benefits of FFS accrue to society or are mainly captured by individuals. Where these are societal, as in the case of the pest infestation that FFS was originally intended to address, the case for public support for FFS is stronger. In other cases, it may be that the greater burden of costs should be borne by individual farmers who wish to benefit, particularly where programmes are not equity targeted.

7.3 Summary

FFS is unlikely to be a cost-effective approach to extension, apart from possibly in cases of serious environmental damage from farming practices. For simple messages about good agricultural practices and dissemination of information, other approaches are likely to be more cost-effective. FFS projects may be justified through their contribution to adult education, improving farmers' skills and capacity to implement complex practices, as well as their adaptability and resilience to shocks. However, there is a need to assess the extent to which farmers are empowered through skills development for this interpretation to be relevant to arguments of cost-effectiveness.

Implications for policy, programme design and future evaluations

8

Chapter highlights

- FFS should not be rolled out in place of national extension schemes, but used more selectively.
- Where FFS projects are implemented, there are lessons to be learned on how to do them better, especially ensuring fidelity to the experiential learning approach.
- Targeted research can help improve our knowledge of when, how and why FFS projects are effective.

Should governments adopt FFS as their main approach to agricultural extension? How can existing FFS programmes be improved? How should future evaluations be conducted and reported? This chapter reports implications of the review for decision makers.

8.1 Implications for policy

FFS will not solve the problems of large-scale extension from the past. The highly intensive nature of the training programme, the relative successes in targeting more educated farmers rather than disadvantaged groups, and the failure to diffuse IPM practices all suggest that the approach is not cost-effective compared to agricultural extension in many contexts. The exception is where existing farming practices are particularly damaging to the environment. So FFS should be used selectively.

If FFS is used, the efforts should not be offset by price distortions or other factors. Stronger policies and regulatory measures may be necessary to counteract the activities of the pesticide industry, including extension workers promoting and selling pesticides. New policies may also be necessary to facilitate participatory agricultural extension approaches and replace earlier extension policies aimed at promoting off-the-shelf technologies and input packages.

8.2 Implications for programme implementation

Where FFS programmes are being implemented, how can they be improved?

Training of facilitators

Facilitator training and performance is important for the success of FFS. Recruitment of facilitators should take into account personal attitude, maturity, literacy, leadership skills, knowledge of local language and farming experience.

The facilitator's sex should be carefully considered, taking account of the target group and cultural context. Training for facilitators should provide sufficient substantive expertise in IPM or other relevant practices appropriate to the local context. The training should also focus on participatory techniques and facilitation skills, emphasising the need to use language and concepts that are familiar to farmers. Facilitators should have access to ongoing support and back-stopping from supervisors and technical experts connected to local research centres.

Field school design and approach

Efficient monitoring and evaluation systems should be put in place alongside FFS implementation, to ensure adequate and timely delivery of resources and follow-up activities, and to ensure that sites selected for FFS are appropriate.

The curriculum and crops covered in FFS should also be adapted according to local agricultural circumstances and tastes. It should balance comprehensiveness with the ability to cover all issues in sufficient depth.

FFS should be delivered according to a participatory and discovery-based approach to learning, including opportunities for farmers to experiment and observe new practices. This is most obviously the case where skills development and other forms of farmer empowerment are the primary objectives. In addition, farmers need to be convinced of IPM and IPPM approaches, which are best done through active participation and having a business-as-usual control plot.

Complementary interventions – access to finance and inputs such as improved seeds and assistance with marketing – may improve FFS effectiveness in terms of agricultural profits (net revenues) for commercial crops.

Targeting

Targeting needs to take account of participants' time availability, access to necessary complementary inputs and decision-making power. These factors have particularly undermined attempts to target women; the same may apply to other groups. Implementing agencies may need to tailor interventions to enable the participation of women and other disadvantaged community members.

Curricula need to be relevant and consistent with the needs and opportunities of women and the poor. For example, where women are primarily responsible for growing subsistence crops, a curriculum that covers only commercial crops is unlikely to attract women participants. Sensitisation exercises in the community might also facilitate the participation of disadvantaged groups – for example, where men do not allow their wives to participate in training because they do not see the benefits or are uneasy about their wives working with other men.

Sustainability

Formal support and encouragement of FFS alumni, including technical assistance and back-stopping, can support the sustainability of FFS practices and related activities. Working with FFS groups to support common goals, good leadership and high attendance rates might facilitate sustainability of FFS activities after the end of the training. In the case of IPM, targeting areas known for overuse of pesticides – and therefore clearer benefits from adoption – are likely to favour sustained impacts.

Dissemination and diffusion

Complementary interventions, such as mass media campaigns, are likely to improve diffusion to non-participating neighbour farmers for only simple IPM messages, such as a 'no early spray' campaign.[124] Given the skills-based nature of the practices promoted in FFS projects, there may be a need for formal community-building activities to ensure diffusion into the wider community. These could draw on existing social networks and attempt to institutionalise the approach whereby FFS graduates are encouraged to train other farmers. However, there needs to be more evidence to assess the success of these approaches. Implementers should consider a more gradual approach to scale-up, favouring depth of coverage within FFS communities over breadth of geographical coverage.

8.3 Implications for evaluation and research funding

Designing evaluations

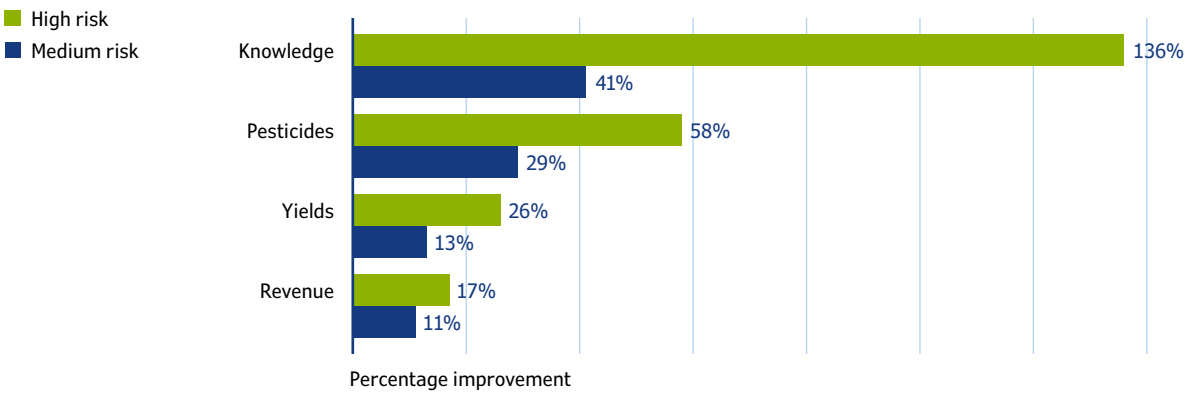
Despite the high commitment to evaluation demonstrated by the FFS community of practice, few of the large number of FFS programme evaluations that we reviewed were sufficiently rigorous to make recommendations for policy. Eighty per cent of studies were found to have a high risk of bias. No studies included in the review used random assignment, although such an approach is very feasible for FFS.[125]

Figure 14 shows that high risk of bias results in the systematic overestimation of impact for all outcomes.

There is a need for more studies that use rigorous counterfactuals, particularly those based on prospective assignment (randomised or otherwise). These should have clear protocols for outcome measurement and reporting, be allocated at cluster level to measure community-wide spillovers, and include long-term follow-ups to determine sustainability.

High-quality impact evaluations that include theory of change analysis help improve the policy relevance and usefulness of findings for implementers. This is because the reasons for failure may be due to flawed programme design or faulty implementation. The policy recommendations in either case are very different. For example, as seen in the review, the lack of impacts on neighbours' yields arise because knowledge diffusion and adoption are limited. On the other hand, lack of impacts at scale appear to be due to implementation challenges in recruiting and training FFS facilitators, rather than programme design issues per se.

Figure 14: Studies with a high risk of bias find greater impacts than those with a medium risk of bias



Impact evaluations therefore need to interrogate the causal chain more consistently, by collecting and reporting data on all intermediate and end-point outcomes, and incorporating qualitative assessment of implementation processes where possible. More studies are needed which evaluate programmes implemented at scale, and which assess whether FFS projects have heterogeneous effects across different groups of farmer beneficiaries, such as women.

Few studies report on the subjective views and experiences of FFS facilitators. This is a weakness of the existing evidence base; future studies should include facilitators and agricultural extension workers, which will support stronger causal chain analysis.

Reporting study methods and findings

Primary studies should report their methods more clearly. Better and more structured reporting of both study abstracts and the full text of primary studies will enhance the ability of reviewers to assess the reliability of quantitative and qualitative research and to incorporate that research in evidence syntheses.

Both quantitative and qualitative studies fail to report details of the FFS interventions they discuss. Better reporting of intervention design and implementation would make findings more meaningful for policy and practice. Greater use of structured abstracts will facilitate easier access to qualitative research in particular, including for the purposes of qualitative synthesis.

Quantitative studies should measure a broader range of outcomes, including farmer empowerment, health and direct measures of environmental impact. These studies should report summary information in a sufficiently transparent way to enable assessment of bias and calculation of study effect sizes for statistical meta-analysis.

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Endnotes

1
World Bank 2007, p.175.

2
InterAcademy Council 2004, cited in Davis 2006.

3
Van den Berg and Jiggins 2007.

4
See, for example, Inter-Academy Council 2004.

5
Birkhaeuser *et al.* 1991.

6
For example, Birkhaeuser *et al.* 1991 and Gautam and Anderson 2000.

7
There has been a similar evolution in the use of more bottom-up approaches to technology development through agricultural research, such as the local agricultural research committees approach (Braun *et al.* 2000; Birner *et al.* 2006).

8
Freire 1970.

9
IPM was developed in the 1960s and 1970s (Kogan 1998, cited in Kelly 2005) to minimise pesticide use through the use of more natural pest management techniques.

10
Authors' estimates. Braun and Duveskog (2008) put the figure at 10–20 million.

11
The data in this paragraph are from 3ie's global FFS portfolio, which drew in part on the earlier review by Braun and Duveskog 2008. The portfolio review includes animal healthcare projects which were excluded from the reviews of effectiveness and barriers and enablers.

12
Feder *et al.* 2004, p.45.

13
Kelly 2005.

14
Van den Berg 2004, p.3.

15
Quizon *et al.* 2001.

16
See White and Waddington (2012) and Higgins and Green (2011) for discussions of systematic review methodology.

17
Existing reviews do not draw on evidence in a systematic manner. They base their conclusions on impact evaluations of unclear quality, using inappropriate methods to synthesise findings. For example, literature reviews use vote counting as opposed to statistical meta-analysis to synthesise quantitative evidence. Statistical meta-analysis uses synthesis methods that take into account both the magnitude of the effect and the study sample size, which is not the case for the one-study-one-vote counting approach. Existing reviews focus on IPM FFS projects, and do not systematically cover evidence from qualitative literature.

18
White 2009.

19
Phillips *et al.* 2014a.

20
Phillips *et al.* 2014b.

21
Waddington *et al.* 2014.

22
Snilstveit *et al.* 2014.

23
www.fao.org/nr/land/sustainable-land-management/farmer-field-school/en/ [Accessed 15 September 2013].

24
Since project documents were not available for many of the FFS projects analysed here, in some cases we imputed objectives from project components.

25
Röling *et al.* 2004.

26
Simpson 1997.

27
Danida 2011.

28
Friis-Hansen and Duveskog 2012, p.416.

29
FAO 2009.

30
Danida 2011, p.39.

31
Van den Berg and Jiggins 2007.

32
Pontius *et al.* 2002.

33
Sustainet 2010.

34
Khisa 2004.

35
Kenmore 1996.

36
Pontius *et al.* 2002.

37
Waddington *et al.* 2012a.

38
Pontius *et al.* 2002.

39
Feder and Savastano 2006.

40
Feder *et al.* 2004.

41
Coady *et al.* 2003.

42
Data on distance from roads is based on one study (Philippines: IPM Collaborative Research Support Programme, Yorobe *et al.* 2011); data on associations are also based on a single study (Ecuador: *Plataformas* programme, Cavatassi *et al.* 2011).

43
The data in this section are based on evaluation documents, rather than project documents that may have reported specific, objectively verifiable targeting criteria.

44
Bangladesh: Danida 2011, Ecuador: Tracy 2007, Cambodia: Simpson 1997 and Indonesia: Van de Fliert 1993, p.130.

45
Twelve projects reported information about excluded groups.

46
Isubikalu *et al.* 2007.

47
Ortiz *et al.* 2002.

48
Godtland *et al.* 2004.

49
Hofisi 2003.

50
FAO 2011.

51
Van de Fliert 1993.

52
Najjar 2009.

53
Danida 2011.

54
Simpson 1997.

55
Hofisi 2003.

56
Van Der Wiele 2004.

57
Najjar 2009.

58
Van de Fliert 1993.

59
Hofisi 2003.

60
Van Der Wiele 2004.

61
Najjar 2009.

62
Tracy 2007.

63
Mancini and Jiggins 2008.

64
This chapter draws on the global portfolio review (Phillips *et al.* 2014a), targeting review (Phillips *et al.* 2014b) and qualitative review (Snilstveit *et al.* 2014). The qualitative review included 20 studies covering FFS projects in 13 countries. Bangladesh: Danida 2011; Cambodia: Simpson 1997; Cameroon: David 2007; India: Mancini *et al.* 2007; Indonesia: Van de Fliert 1993, Winarto 2004; Kenya: Hiller *et al.* 2009, Karanja-Lumumba *et al.* 2007, Najjar 2009, Machacha 2008, Friis-Hansen *et al.* 2012; Liberia: Van Der Wiele 2004; Nicaragua: Gottret and Cordoba 2004; Philippines: Rola and Baril 1997, Palis 2006; Tanzania: Pedersen *et al.* 2008; Trinidad and Tobago: Dolly *et al.* 2009; Uganda: Isubikalu *et al.* 2007, Friis-Hansen 2008; Zimbabwe: Hofisi 2003. Additional studies from six countries were drawn on from the targeting review and the review of effects. China: Yang *et al.* 2008; Ecuador: Tracy 2007; Ethiopia: Endalew 2009, Todo and Takahashi 2011; Ghana: David and Asamoah 2011; Malawi: Yajima 2010; Nicaragua: Labarta 2005.

65
Studies are not always clear whether the factors they described resulted in non-attendance or drop out; the analysis therefore combines the two.

66
Friis-Hansen 2008, p.519.

67
This chapter draws on the targeting review (Phillips *et al.* 2014b), the qualitative review (Snilstveit *et al.* 2014) and the review of effectiveness. The review of effectiveness included 18 policy-actionable impact evaluation studies covering FFS projects in 14 countries. Bangladesh: Ricker-Gilbert *et al.* 2008; China: Wu 2010, Yang *et al.* 2008; Ecuador: Cavatassi *et al.* 2011; Ethiopia: Todo and Takahashi 2011; India: Pananurak 2010; Indonesia: Feder *et al.* 2004, Yamazaki and Resosudarmo 2008; Kenya: Davis *et al.* 2012; Pakistan: Ali and Sharif 2011, Pananurak 2010; Peru: Godtland *et al.* 2004, Van Rijn 2008; Philippines: Yorobe *et al.* 2011; Tanzania: Davis *et al.* 2012; Thailand: Praneetvatakul *et al.* 2007; Uganda: Davis *et al.* 2012; Viet Nam: Rejesus *et al.* 2009. The review of effectiveness also included 72 additional impact evaluation studies in 28 countries. Bangladesh: Danida 2011, Walter-Echols and Soomro 2005; Benin: Lund *et al.* 2010; Bolivia: Bentley *et al.* 2002, Torrez *et al.* 1999; Cambodia: Simpson 1997; Cameroon: David 2007, Gockowski *et al.* 2005, Wandji *et al.* 2007; China: Haiyang 2002, Mangan and Mangan 1998, Ooi and Kenmore 2005, Walter-Echols and Soomro 2005, Yang *et al.* 2005; Ecuador: Cole *et al.* 2007, Mauceri *et al.* 2007; Ethiopia: Amera 2009, Endalew 2009, Kelemework 2005; Ghana: Carlberg *et al.* 2012, David and Asamoah 2011, Dankyi *et al.* 2005, Gockowski *et al.* 2010; India: Birthal *et al.* 2000, Mancini and Jiggins 2008, Mancini 2011, Naik *et al.* 2010, Pouchepparadjou *et al.* 2005, Walter-Echols and Soomro 2005; Indonesia: Mariyono 2007, Norvell and Hammig 1999, Van de Fliert *et al.* 2001; Iran: Dinpanah *et al.* 2010; Kenya: Achonga *et al.* 2011, Bunyatta *et al.* 2006, De Jager 2007, Hiller *et al.* 2009, Waarts *et al.* 2012, Williamson *et al.* 2003; Liberia: Van Der Wiele 2004; Mexico: Orozco-Cirilo *et al.* 2009; Myanmar: Kabir and Uphoff 2007; Nepal: Lama *et al.* 2003, Pande *et al.* 2009; Nicaragua: Labarta 2005; Nigeria: Odeyemi and Asiabaka 2005; Pakistan: Islam *et al.* 2006, Khan *et al.* 2007, Walter-Echols and Soomro 2005; Peru: Zuger 2004; Philippines: Palis 2006, Price 2001, Rola *et al.* 2002; Sudan: Khalid n.d.; Sri Lanka: Jones *et al.* 2002, Tripp *et al.* 2005, Van den Berg and Amarasinghe 2003; Tanzania: Friis-Hansen and Duveskog 2012; Pedersen *et al.* 2008; Viet Nam: Chi 1998, Huan *et al.* 1999, Murphy *et al.* 2002, Walter-Echols and Soomro 2005; Uganda: Erbaugh *et al.* 2010, Friis-Hansen *et al.* 2004, Friis-Hansen and Duveskog 2012, Nabirye *et al.* 2003, Olanya *et al.* 2010; Zimbabwe: Hofisi 2003, Maumbe and Swinton 2003, Mutanda and Mpangwa 2004, Rusike *et al.* 2004.

68
Effects of FFS reported in magnitudes (percentage changes) in this chapter are based on the 18 policy-actionable impact evaluation studies we identified. A further 72 impact evaluation studies were assessed as being at high risk of bias in the systematic review critical appraisal; these additional studies were drawn on in the analysis, but the magnitude of change is considered biased (see Figure 14).

69
Godtland *et al.* 2004, Rejesus *et al.* 2009 and Ali and Sharif 2011, respectively. This section draws on the quantitative and qualitative syntheses (see endnote 64).

70
Van Rijn 2008.

71
India: Mancini *et al.* 2007; Cambodia: Simpson 1997; Indonesia: Winarto 2004; Kenya: Friis-Hansen *et al.* 2012, Machacha 2008; Liberia: Van Der Wiele 2004; Uganda: Friis-Hansen 2008; Zimbabwe: Hofisi 2003; Peru: Van Rijn 2008; Trinidad and Tobago: Dolly 2009.

72
Mancini *et al.* 2007 and Najjar 2009.

73
Kenya: Machacha 2008; Uganda: Friis-Hansen 2008; Kenya: Friis-Hansen *et al.* 2012; Indonesia: Winarto 2004.

74
Friis-Hansen *et al.* 2012.

75
Danida 2011, Mancini *et al.* 2007, Friis-Hansen *et al.* 2012, Machacha 2008, Najjar 2009, Dolly 2009.

76
The Ministry of Agriculture FFS in Kenya (Najjar 2009) and Bangladesh Agricultural Extension Component of the Agricultural Sector Program Support (Danida 2011).

77
See Wu 2010, Yorobe *et al.* 2011 and Pananurak 2010, respectively.

78
See Ali and Sharif 2011, Todo and Takahashi 2011 and Van Rijn 2008, respectively.

79
Viet Nam: Rejesus *et al.* 2009; Indonesia: Feder *et al.* 2004, Yamazaki and Resosudarmo 2008.

80
Praneetvatakul *et al.* 2007 and Pananurak 2010.

81
Simpson 1997, pp.136–137.

82
Feder *et al.* 2004, Yamazaki and Resosudarmo 2008.

83
Van den Berg and Jiggins 2007.

84
Praneetvatakul *et al.* 2007.

85
Van de Fliert 1993. This was noted in a project in India too (Mancini *et al.* 2007).

86
Praneetvatakul *et al.* 2007.

87
Meta-analysis estimates from 12 projects that facilitated group formation and three projects that did not (see Waddington *et al.* 2014).

88
Van de Fliert 1993.

89
Palis 2006.

90
China: Wu 2010; Pakistan: Ali and Sharif 2011, Pananurak 2010; Kenya and Tanzania: Davis *et al.* 2012; Ethiopia: Todo and Takahashi 2011.

91
Ecuador: Cavatassi *et al.* 2011; Peru: Van Rijn 2010.

92
Environmental impact quotient calculates the active ingredients in pesticides and applies a rating system in 10 categories to identify a single value of the environmental impact rating. The 10 categories include: (i) action mode of pesticides, (ii) acute toxicity to birds, (iii) fish, (iv) bees, (v) acute dermal toxicity, (vi) long-term health effects, (vii) residue half-life in soil and (viii) plant surface, (ix) toxicity to beneficial organisms, and (x) groundwater and run-off potential (Kovach *et al.* 1992).

93
The findings were on average positive across the three projects; see Pananurak 2010, Praneetvatakul *et al.* 2007 and Cavatassi *et al.* 2011. While two projects did show positive effects individually, the findings from Ecuador are not statistically significant (Cavatassi *et al.* 2011).

94
Winarto 2004 and van de Fliert 1993.

95
Winarto 2004, p.363.

96
Machacha 2008.

97
Danida 2011.

98
Van de Fliert 1993, Van Der Wiele 2004.

99
Dolly *et al.* 2009, Gottret and Cordoba 2004, Simpson 1997.

100
David 2007.

101
Simpson 1997.

102
See Pananurak 2010, Khan *et al.* 2007, Feder *et al.* 2004, Wu 2010 and Labarta 2005, respectively.

103
Indonesia: Winarto 2004, p.356; India: Mancini *et al.* 2007.

104
It does not seem unreasonable to expect a diffusion of simple practices such as reduced pesticide use following interaction between FFS graduates and their communities, at least in the short term. One rice and vegetable IPM FFS in Bangladesh did find evidence for diffusion of simple knowledge (Ricker-Gilbert *et al.* 2008). See Pananurak 2010 and Wu 2010 for Pakistan and China, respectively.

105
Cameroon: David 2007; Cambodia: Simpson 1997; Indonesia: Van de Fliert 1993, Feder and Savastano 2006; Philippines: Palis 2006.

106
Van de Fliert 1993.

107
Winarto 2004, p.351.

108
Cameroon: David 2007; Kenya: Machacha 2008; Philippines: Palis 2006.

109
Honduras: Gottret and Cordorba 2004; Kenya: Hiller *et al.* 2009; Cambodia: Simpson 1997.

110
Wu 2010 and Pananurak 2010.

111
Pemsl *et al.* 2006.

112
White 2014.

113
Danida 2011.

114
Similar to our figures, Van den Berg and Jiggins (2007) report costs of FFS projects per graduating farmer ranging from less than US$1 to over US$60.

115
Bentley *et al.* 2002.

116
Pananurak (2010) calculated costs as operational project costs and opportunity costs of participating farmers (equal to the daily hired wage). To assess the benefits of the project, Pananurak included savings resulting from reduced pesticide use and earnings resulting from increased yields, assuming 100 per cent adoption of IPM.

117
A benefit-cost assessment of the National IPM FFS in Thailand (Praneetvatakul *et al.* 2007) found a BCR of 5.56, assuming 30 years of adoption and 1.22 with only 2 years of adoption. However, the authors do not report the methods and assumptions used in this study clearly, particularly with regard to the adoption rate, so they are not included here.

118
Ricker-Gilbert *et al.* (2008) calculated the BCR as the difference between benefits (net agricultural revenues) and costs (including variable costs of training and farmer opportunity costs assumed at US$1 per day).

119
Rejesus *et al.* 2009. To our knowledge, no cost-benefit analyses to date have included health, environmental and empowerment benefits.

120
Gautam and Anderson 2000.

121
See, for example, Waddington and Snilstveit 2010.

122
http://www.fao-ilo.org/fao-ilo-youth/fao-ilo-jffls/en/ [Accessed 27 January 2014].

123
King *et al.* 2010.

124
Ricker-Gilbert *et al.* 2008.

125
Two ongoing studies use cluster-randomised assignment to evaluate FFS impacts. China: Kumar *et al.* (forthcoming); and the Philippines: Masset and Haddad (forthcoming).

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At least 10 million farmers in 90 countries have participated in farmer field school (FFS) projects to gain specialist agricultural skills, knowledge and – in some programmes – empowerment.

Impact evaluations show that participating farmers typically benefit from FFS projects based on integrated pest management (IPM) and other curricula. For scaled-up programmes implemented over longer periods there is no evidence of positive effects. Problems in recruiting appropriate FFS facilitators have impeded scaled-up programmes. Non-participating neighbouring farmers do not benefit from diffusion of knowledge about IPM from trained farmers. So even effective, small-scale FFS projects may not be cost-effective.

Drawing from a full systematic review of some 500 papers, this summary concludes that FFS projects should be used selectively to solve specific problems in particular contexts – not as a one-size-fits-all approach.

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