

Farmer field schools: a systematic review

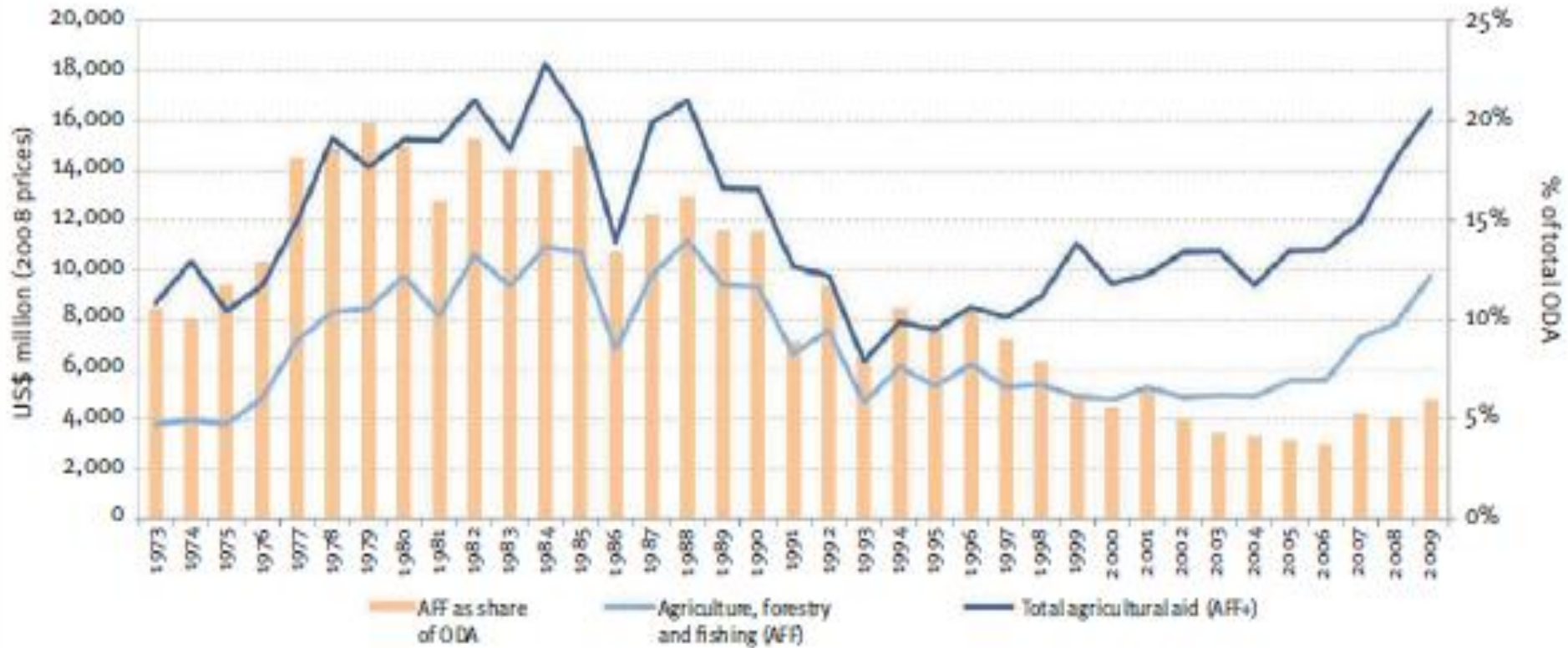
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Co-authors

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Agriculture starting to come back on the agenda

Figure 1: Aid to agriculture, total and percentage of ODA



Source: Cabral and Howell 2012, ODI

Agricultural extension

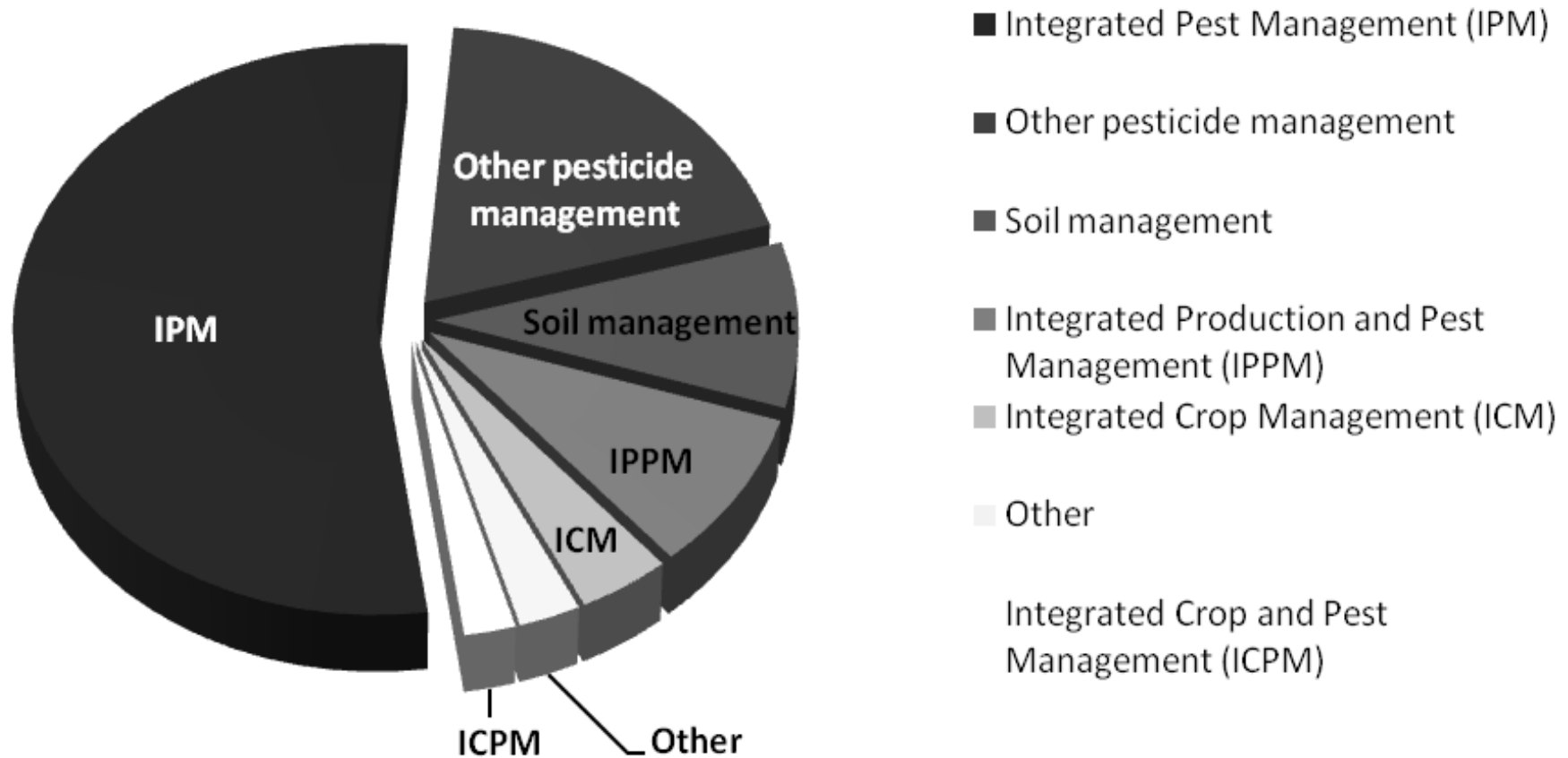
- But age old questions remain:
 - how to raise farmer productivity?
 - how to reach the poorest and marginalised (eg women)?
- Ag extension has been part of tool box forever but got a bad rap in last two decades – e.g. rise and fall of T&V
- Participatory extension like Farmer Field Schools are what is new, the latest fad "that works"

A 'best practice' FFS



- Group of 25 farmers, meeting once a week in a designated field during the growing season
- Exploratory: facilitator encourages farmers to ask questions, and to seek answers, rather than lecturing or giving recommendations.
- Experimentation: group manages two plots
- Participatory: emphasis on social learning with exercises to build group dynamics
- Field days and follow-up activities may be provided for diffusion of message to neighbours

Types of curricula



**Input 1 Training
of trainers**

**Input 2 Field
school**

Farmer field school stylised ToC...

**Capacity
building (FFS
participants)**

**Capacity
building (FFS
neighbours)**

**Adoption
(FFS
participants)**

**Adoption
(FFS
neighbours)**

Measured impacts:
Yield, input-output ratio,
income, empowerment,
environmental
outcomes, health

...with assumptions

Input 1 Training of trainers

Input 2 Field school

- Facilitators adequately trained
- Farmers and facilitators attend sufficient meetings
- FFS synchronised with planting season

Capacity building (FFS participants)

Capacity building (neighbours)

- Field days/follow-up
- High degree of social cohesion
- Geographical proximity to other farmers (observation) or market (communication)

Adoption (FFS participants)

Adoption (neighbours)

- Curriculum relevant to problems facing farmers
- Farmer attitudes changed (convinced message appropriate)
- Relative advantage over old techniques

Measured impacts:
Yield, input-output ratio, income, empowerment, environmental outcomes, health

- New technology appropriate
- Market access
- Favorable prices
- Environmental factors including weather, soil fertility

Polarised debate on FFS

- "Studies reported substantial and consistent reductions in pesticide use attributable to the effect of training. In a number of cases, there was also a convincing increase in yield due to training.... **Results demonstrated remarkable, widespread and lasting developmental impacts**" (Van den Berg 2004, FAO)
- "The analysis, employing a modified 'difference-in-differences' model, indicates that **the program did not have significant impacts on the performance of graduates and their neighbors**" (Feder et al. 2004)
- But how good are they really - what does a systematic look at the evidence say?

Theory-based systematic review

- Review registered with Campbell Collaboration
- Uses theory of change to examine program mechanisms and outcomes along causal chain
- 3-part data review:
 - Quantitative review of effects (impact evaluations)
 - Qualitative review of barriers and facilitators
 - Global portfolio review of projects
- Integrated synthesis based around causal chain

Review inclusion criteria (PICOS)

- **Population** is farm households in low and middle income countries (data collected and analysed at household level)
- **Intervention**: programmes explicitly referred to as 'farmer field school'
- **Outcomes**: effectiveness across the causal chain
 - Knowledge (+ attitudes): what was learnt?
 - Adoption: did farmers utilise new technologies (methods of planting, approach to disease/pest control, other inputs)?
 - Impact on yields, revenues, environment, health, empowerment etc.
- **Study designs**:
 - Effects: experimental, quasi-experimental with controlled comparison (no treatment, pipeline, other intervention)
 - Barriers/facilitators: qualitative with reporting on data collection (CASP)

Search methods

- Comprehensive search for published and unpublished literature:
 - General: SSCI, IBSS, EconLit,
 - Subject specific: AgEcon, CAB Abstracts, Agricola, US National Agricultural Library
 - ‘Unpublished’: JOLIS, BLDS, IDEAS, Google, Google Scholar, Theses and Dissertations
- Hand search (journals, organisation websites)
- Literature snowballing (citation tracking)
- Contact key researchers and organisations

Effectiveness

27,866 titles screened

1453 abstracts screened

126 no access

369 full text obtained

186 excluded:
128 on relevance
58 on design (no comparison)

183 Extension impact papers:
134 FFS
49 non-FFS

134 FFS impact papers

80 individual FFS studies

Causal Chain Analysis

1,112 abstracts screened

751 excluded

312 full text sought

49 no access

257 excluded

Qualitative Synthesis

25 qualitative papers

20 individual FFS studies

BB+ Synthesis

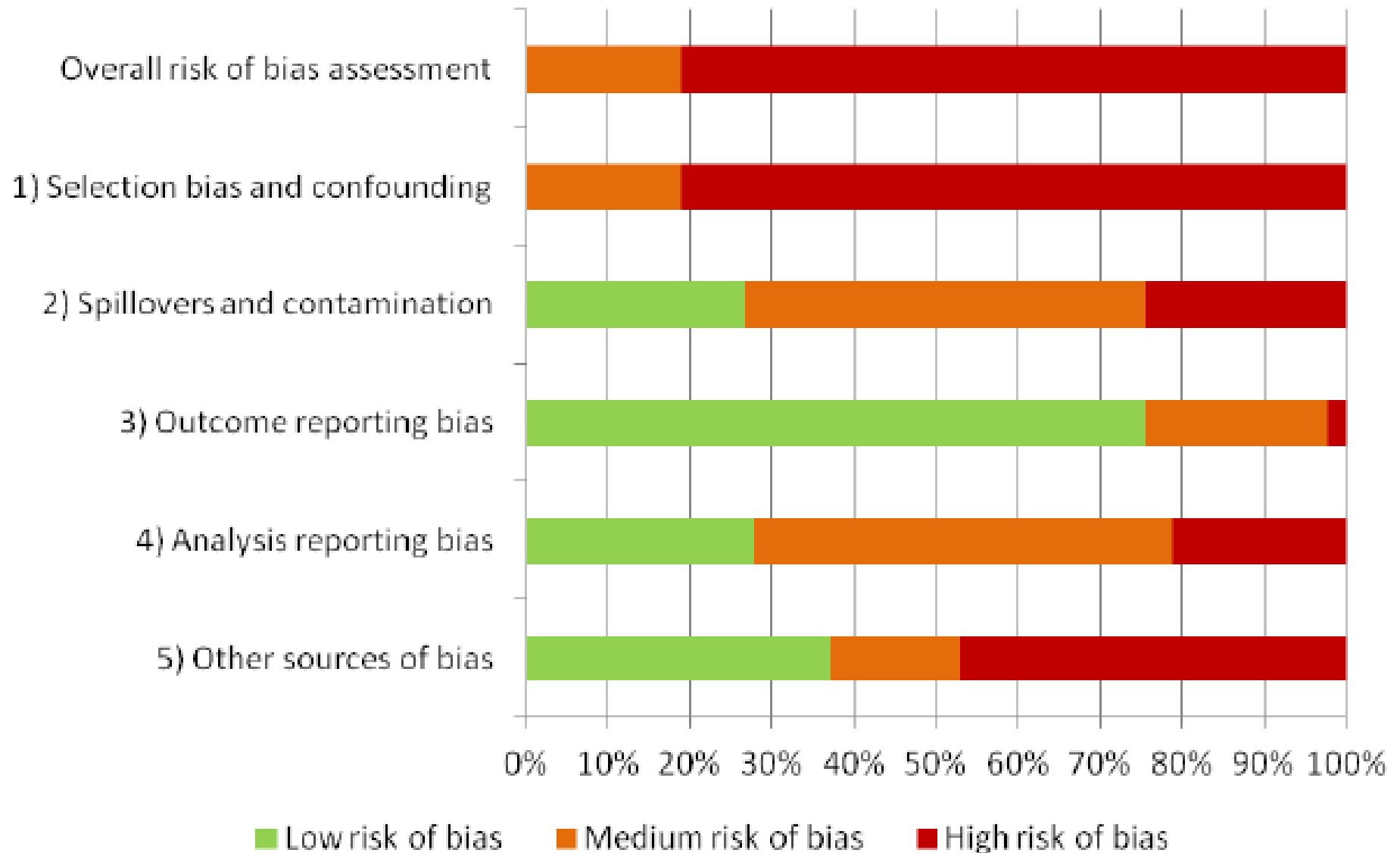
30 IE and sister papers

11 individual FFS studies

Characteristics of included impact evaluations

- **93 FFS interventions:** East Asia, South Asia, Latin America, Middle East, sub-Saharan Africa
 - Cotton, rice, other cash crops, and food crops
 - IPM, IPPM, IPNM, ICM, IWM
 - Some with co-interventions (input support, marketing support)
- **Design: No RCTs;** quasi-experiments of varying quality (PSM, diff-in-diff, instrumental variables, Heckman, group means comparison)
- All effects measured relative to non-FFS farmers comparison; **study arms include FFS-participants and 'neighbouring' farmers to measure spillovers** (farmer-to-farmer diffusion)
- **Small samples** (approx. 200 farmers, often only a handful of villages) and short follow-up periods (most studies less than 2 years)

Internal validity assessment



Synthesis of outcomes across the causal chain:

Knowledge → adoption → diffusion →
agriculture yields → net income (profits)

→ Environment
→ Health outcomes
→ Empowerment

Effect sizes

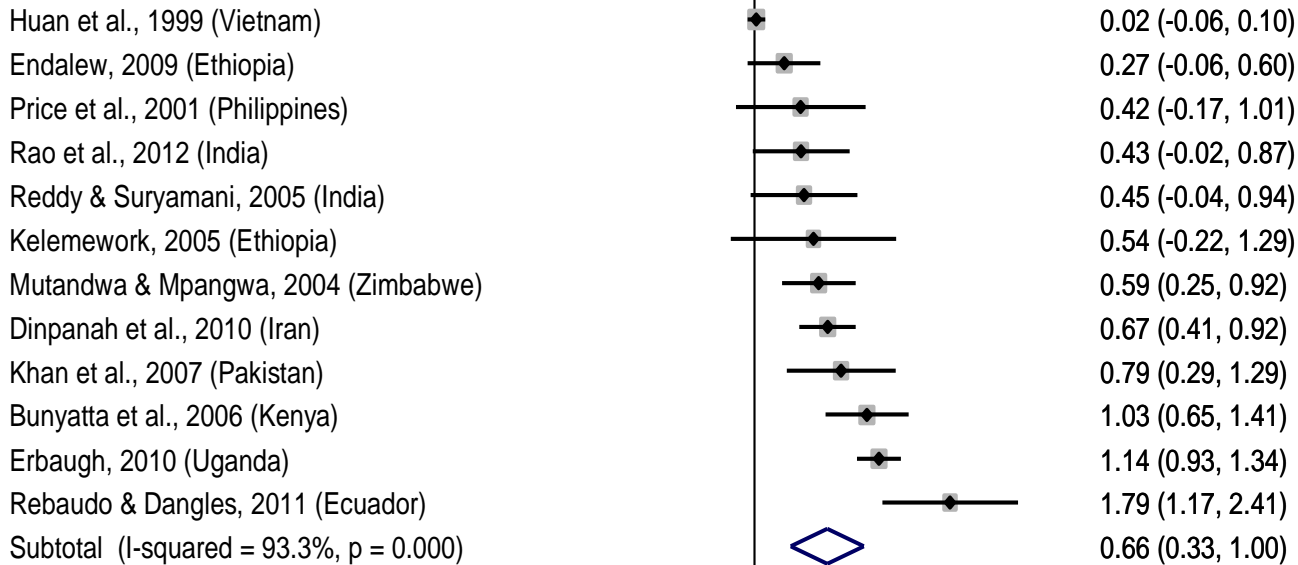
- Intermediate and endpoint outcomes synthesised
- Standardised mean differences for outcomes without 'natural' scale unit and zero points (knowledge and adoption indexes)
- Response ratios for outcomes based on ratio scale (pesticide use, yields, income, environment) and probabilities (health, empowerment)

Study

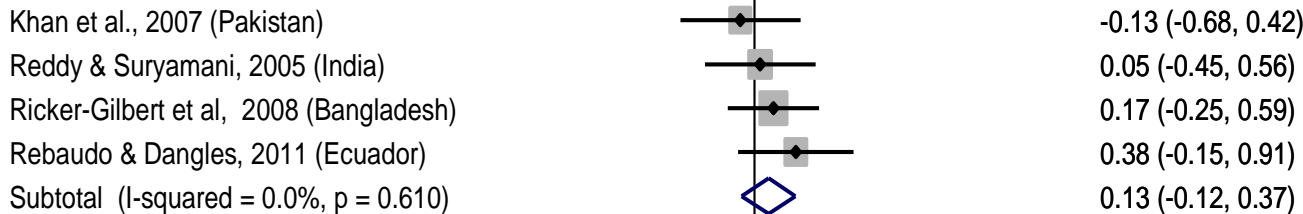
ID

ES (95% CI)

FFS participants



FFS neighbours



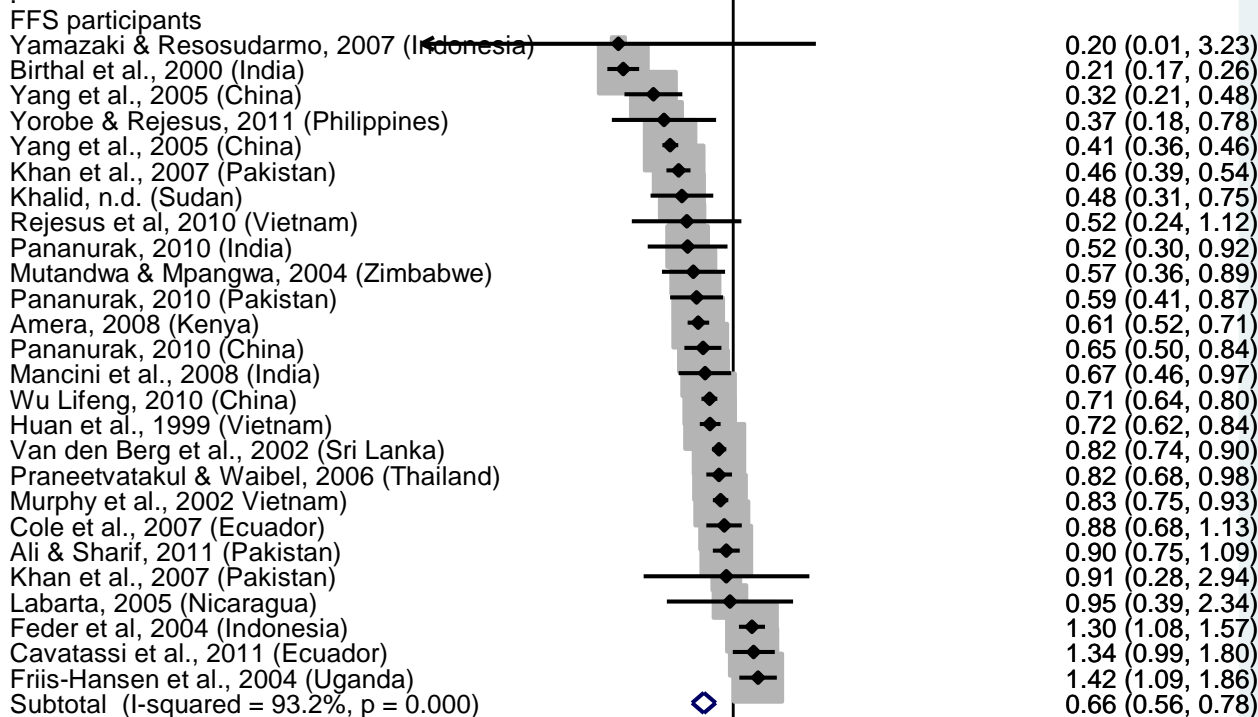
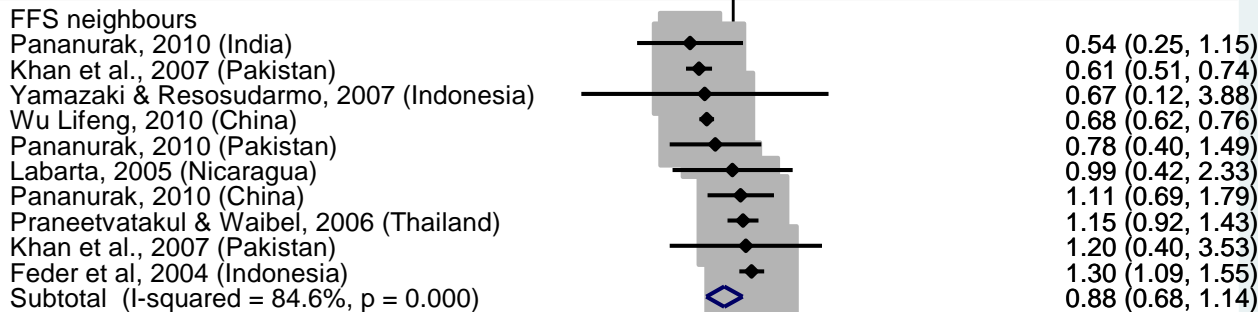
NOTE: Weights are from random effects analysis

Positive
impacts on
knowledge
among
participants

-0.5 0 .5 1 3
Favours intervention

Study ID

ES (95% CI)



NOTE: Weights are from random effects analysis

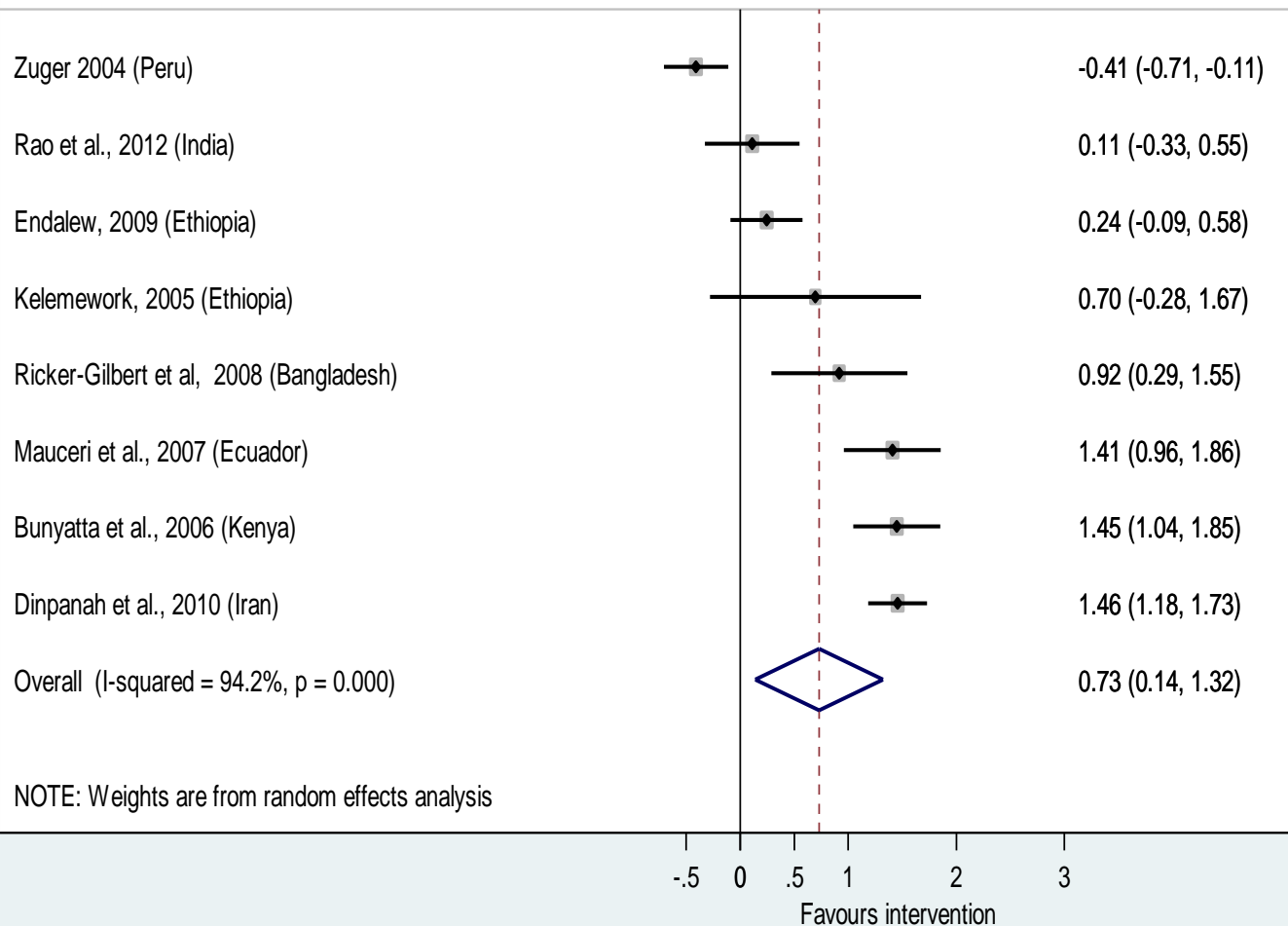
.1 .25 .5 1 2
Favours intervention

Reduced
pesticide
demand
among
participants
not
neighbours

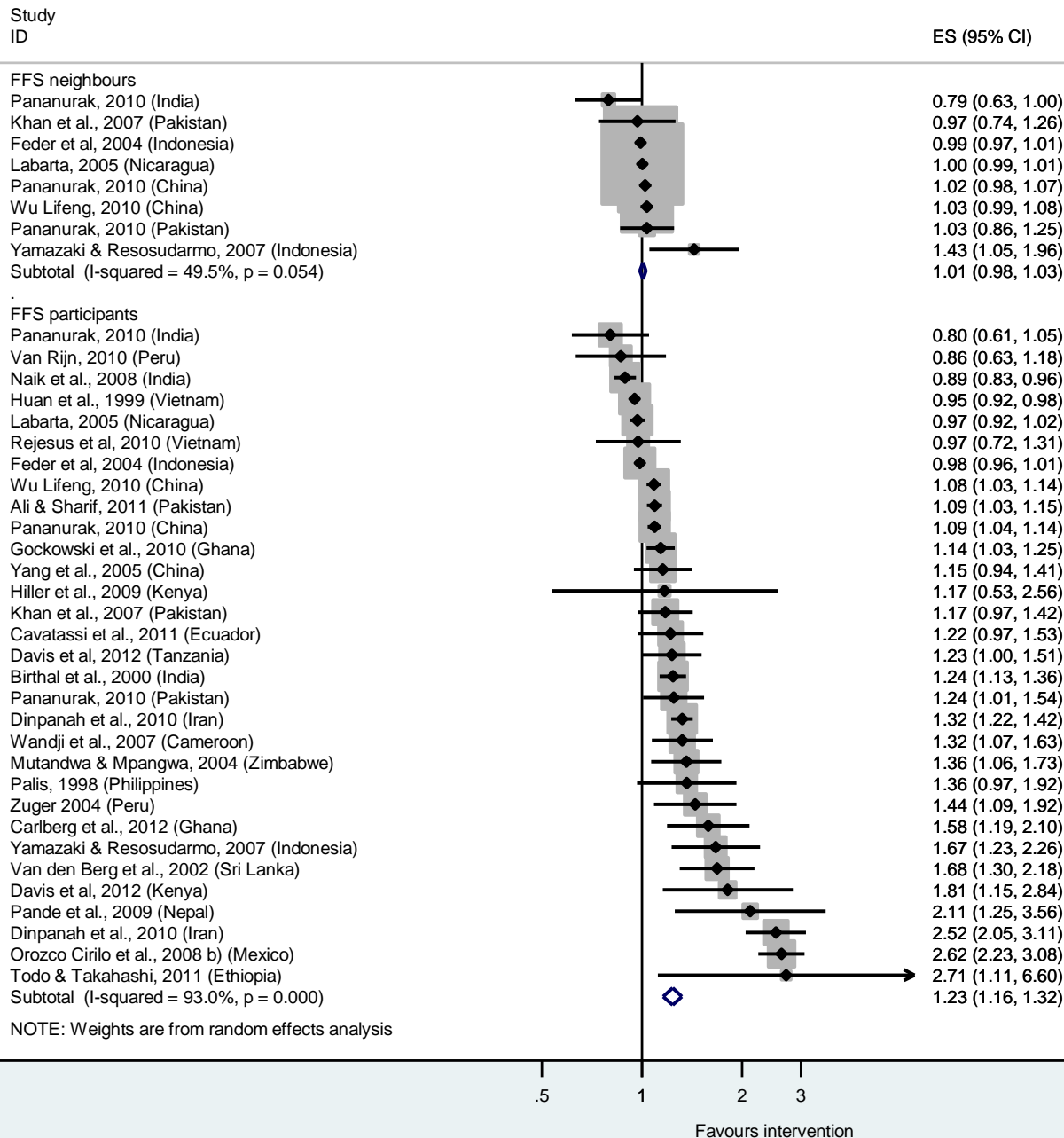
Study

ID

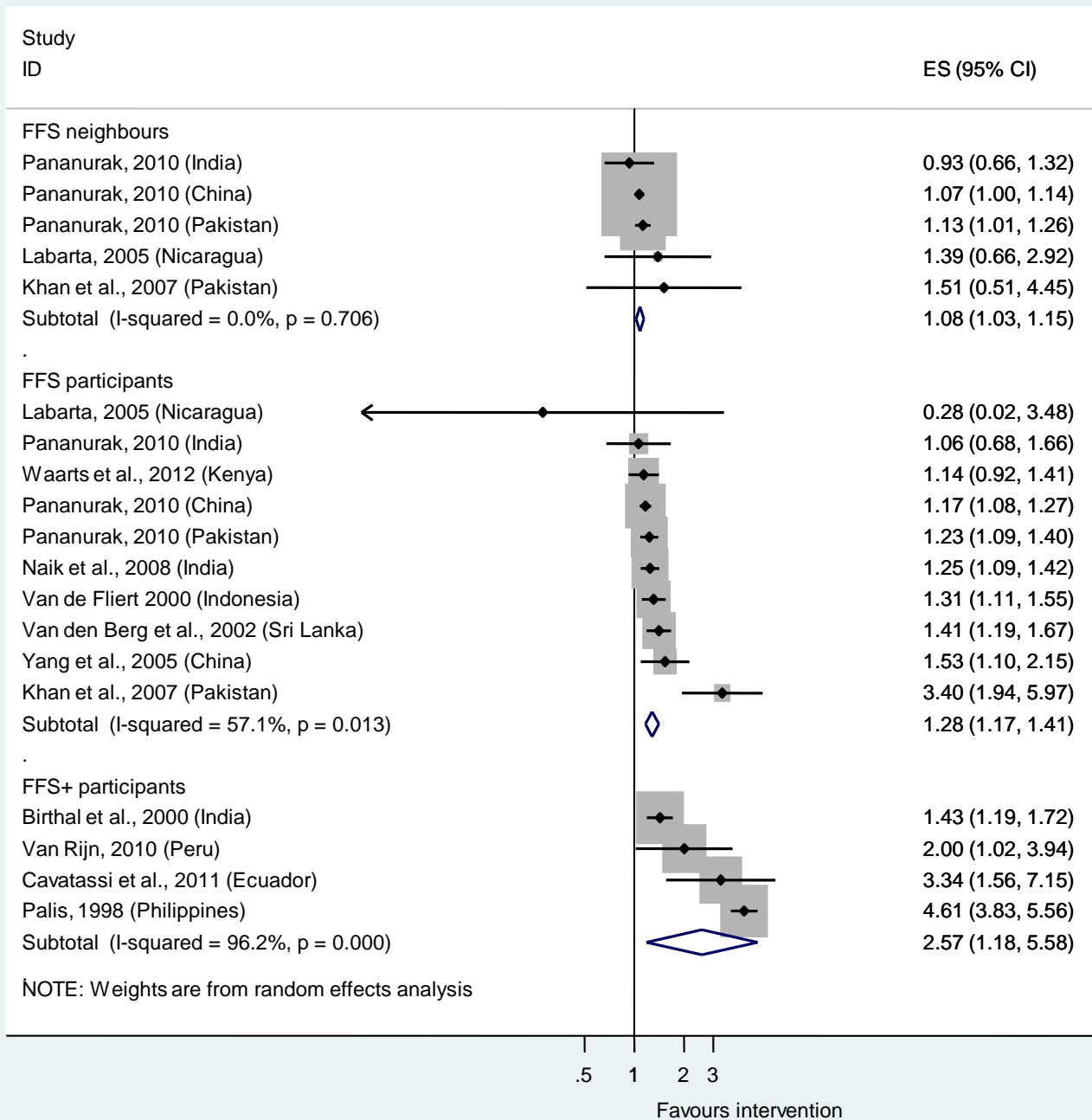
ES (95% CI)



Positive
impacts on
other
adoption
measures
among
beneficiaries



Increased
yields among
FFS-
beneficiaries
not
neighbours



Increased revenues
among
participants
of FFS and
FFS+

Limited knowledge spillovers among neighbours explains lack of adoption and impact

Study

ID

ES (95% CI)

Num complex practices known

-0.09 (-0.49, 0.32)

Num intermediate practices known

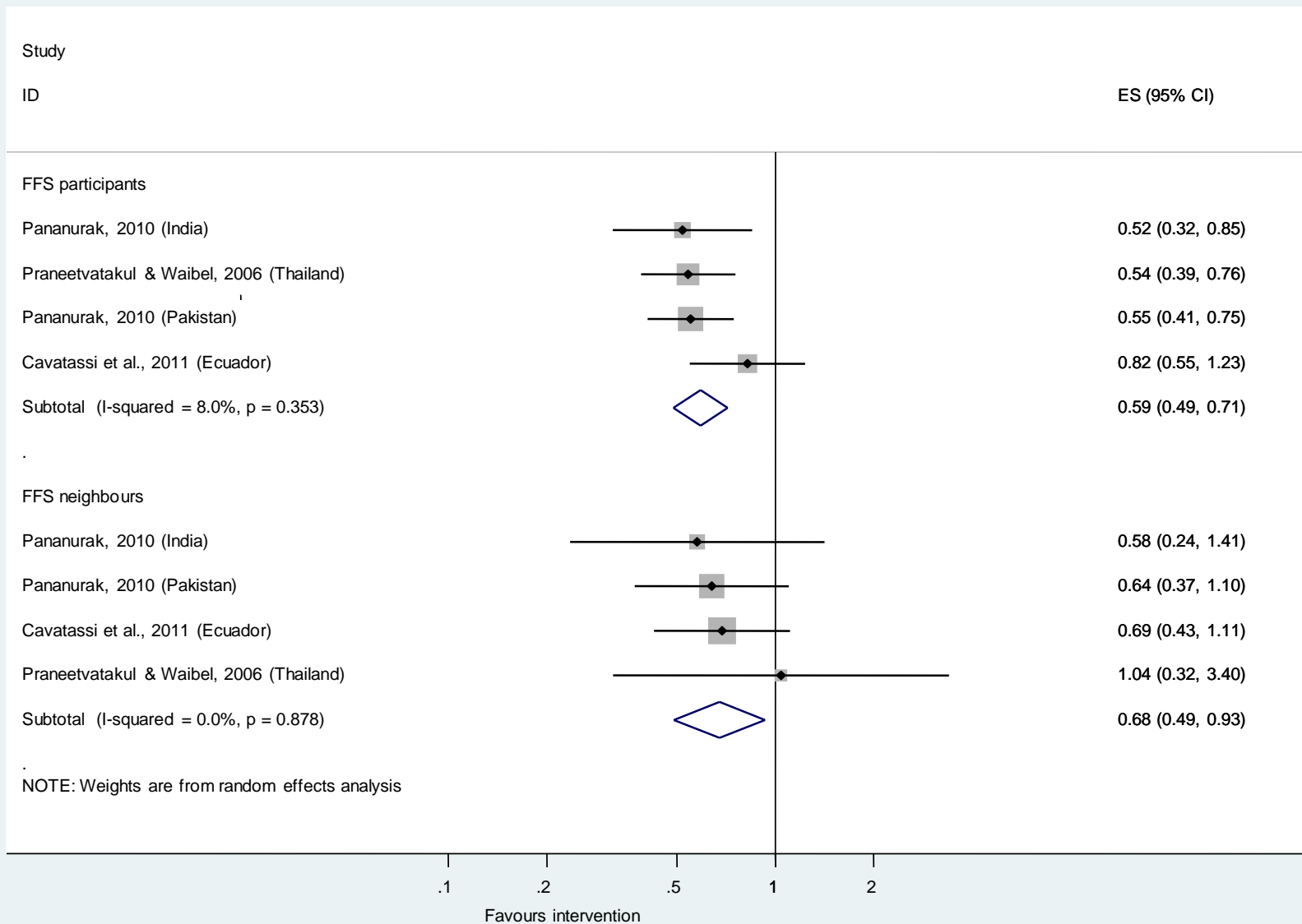
0.11 (-0.31, 0.53)

Num simple practices known

0.49 (0.11, 0.88)

-0.5 0 .5 1 2
Favours intervention

Reduced environmental risk factors



Farmers feel empowered, more confident

Study

ID

Hiller et al., 2009 (Kenya)

Friis-Hansen & Duveskog, 2012 (Uganda)

Friis-Hansen & Duveskog, 2012 (Tanzania)

Friis-Hansen & Duveskog, 2012 (Kenya)

Van Rijn, 2010 (Peru)

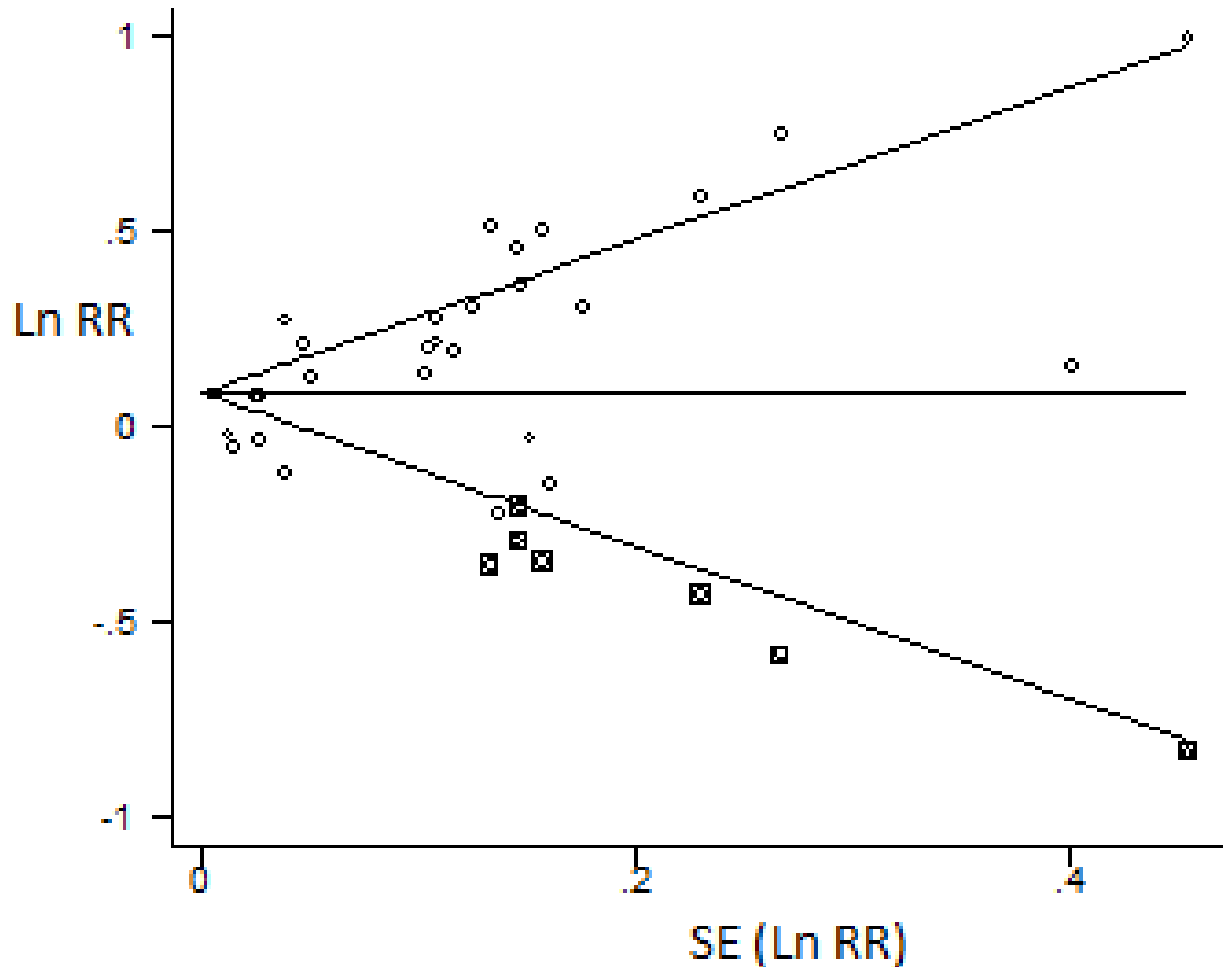
Rusike et al., 2004 (Zimbabwe)

.2 .5 1 Favours intervention 2 3

Sensitivity analysis

Publication bias in evidence on yields

Filled funnel plot with pseudo 95% confidence limits

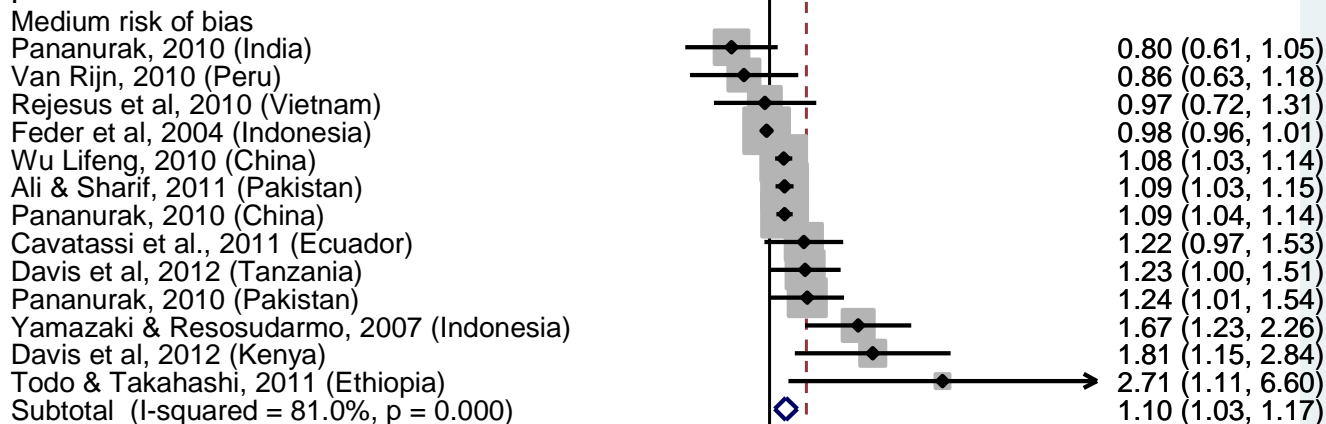
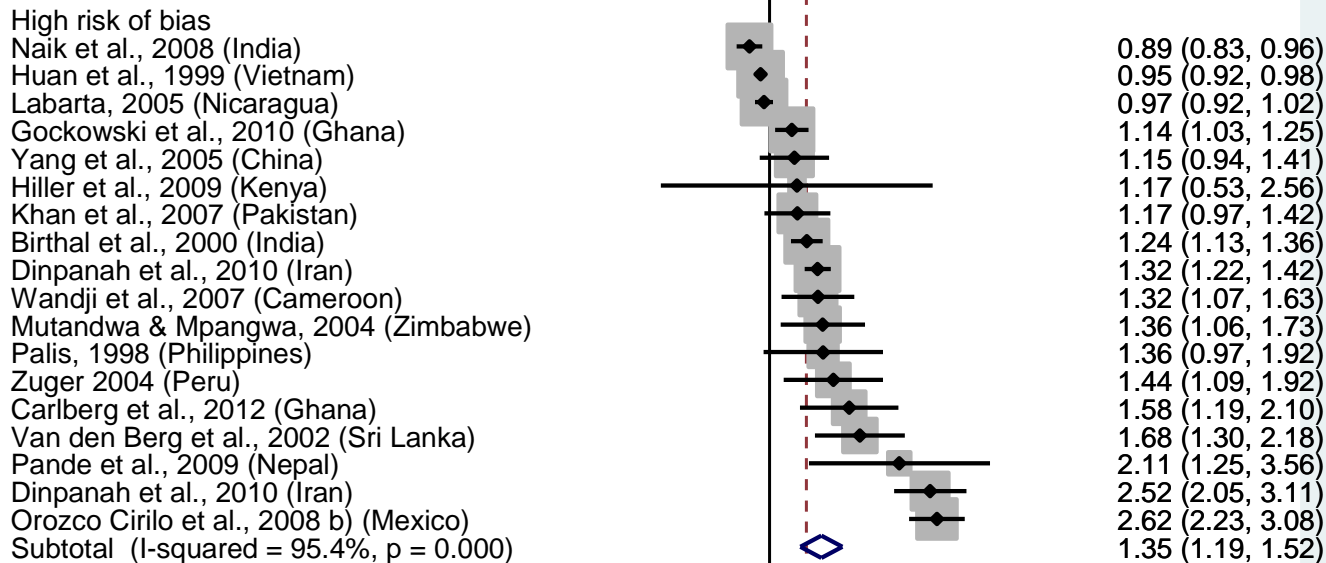


	95% L	ES	95% U	#
MA	1.10	1.18	1.25	23
Filled MA	1.00	1.07	1.14	30

Egger's test: P=0.002

Study ID

ES (95% CI)



Overall (I-squared = 93.0%, p = 0.000) 1.23 (1.16, 1.32)

NOTE: Weights are from random effects analysis

.5 1 2 3
Favours intervention

Sensitivity analysis:
Yields by risk of bias status

High risk of bias studies over-estimate impacts

Moderator analysis: high risk of bias excluded

Crop	Effect size	95% confidence interval		Num. estimates	I-squared
<i>Rice</i>	1.14	0.85	1.54	3	82.3% (p=0.004)
Cotton	1.09	1.06	1.12	4	0.0% (p=0.675)
Staples/veg	1.37	1.10	1.70	4	43.6% (p=0.150)
Cash crops (tea, coffee, cocoa)	0.86	0.63	1.18	1	n/a
Region					
<i>East Asia & Pacific</i>	1.07	0.99	1.17	4	88.0% (p=0.000)
<i>Latin America & Caribbean</i>	1.04	0.74	1.46	2	67.6% (p=0.079)
South Asia	1.12	1.01	1.24	2	29.3% (p=0.234)
Sub-Saharan Africa	1.58	1.06	2.36	3	58.5% (p=0.090)
Length of follow-up					
Up to 2 years	1.14	1.06	1.23	7	51.3% (p=0.055)
<i>More than 2 years</i>	1.06	0.95	1.17	5	83.4% (p=0.000)

Summary of quant findings

- FFS increase knowledge and improve adoption of the FFS practices (e.g., reduction in pesticide-use)
- Without negatively affecting the yields and incomes, on average increasing one or both
- Suggestions of farmers feeling empowered
- Limited, if any, spillovers: Some simple knowledge may diffuse to neighbours, but not complex
- Neighbours do not adopt the practices consistently

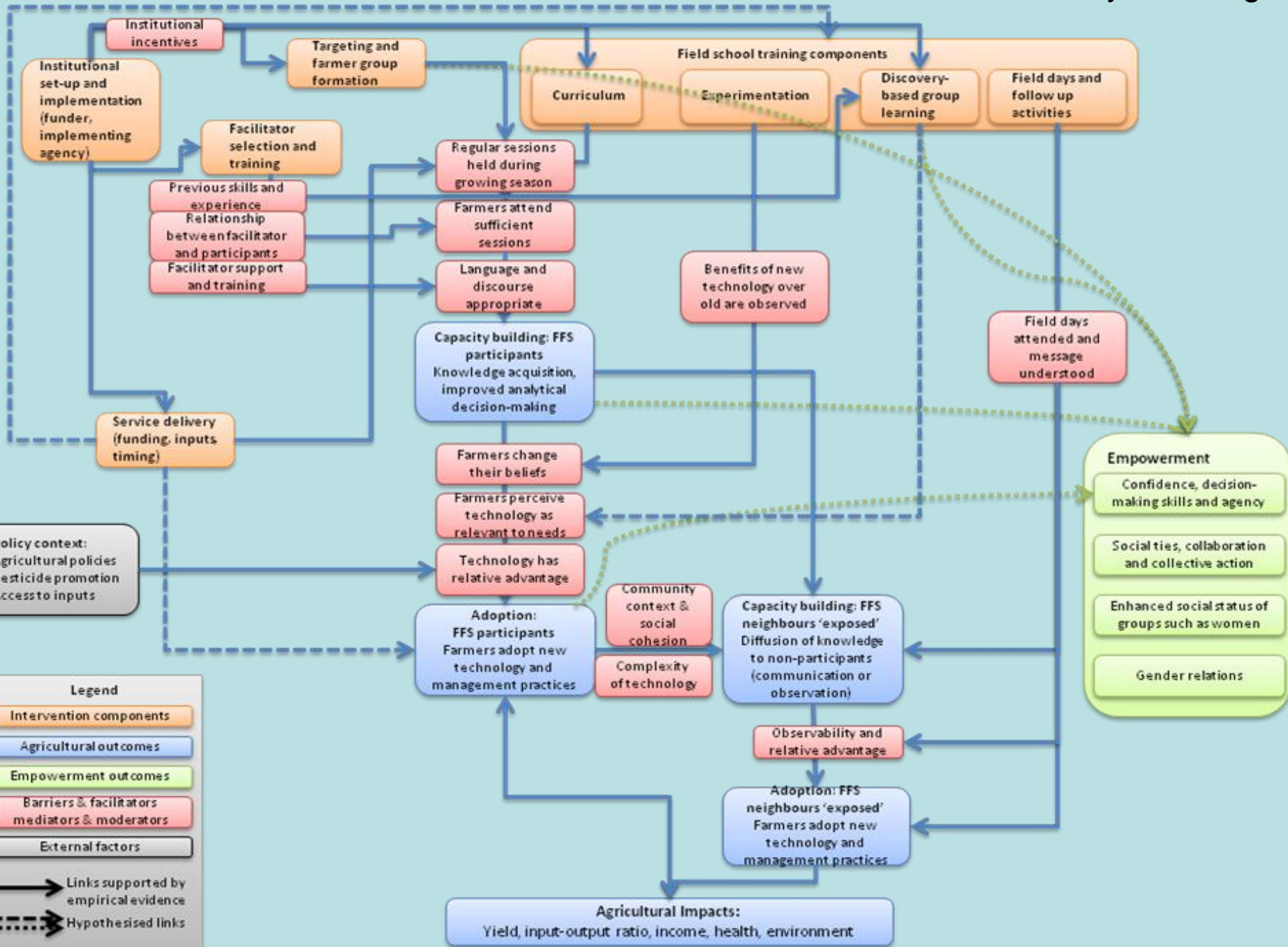
But what were the barriers and facilitators of these effects on outcomes?

- Full story of qualitative synthesis: Birte Snilstveit's presentation Friday 9.30am

In brief, qualitative evidence highlights key process and implementation factors

- Targeting and participation (interest, group dynamics)
- Appropriateness of the curriculum for the farmers
- Delivery of the curriculum (participatory)
- Facilitators facilitation skills, perception by the participants
- Language of instruction and the way the ideas are introduced
- Policy context (eg subsidies and promotion of pesticides)

Revised theory of change



Lessons for design of SRs

- Protocol development crucial – piloting of searches, data collection tool and critical appraisal technique
- Early development of theory of change (with underlying assumptions)
- Balance between comprehensive study and budget: keep interventions narrow, careful consideration of inclusion criteria for causal chain analysis
- Iteration between review components required to produce integrated rather than parallel synthesis
- Integrated synthesis is resource intensive, particularly for large bodies of evidence such as FFS

Thank you

Review available shortly:

<http://campbellcollaboration.org/lib/project/203/>

Please visit:

www.3ieimpact.org/systematicreviews