



International Initiative for Impact Evaluation

**Aquaculture for improving productivity, income,
nutrition, and women's empowerment
in L&MICs: a systematic review and meta-analysis**

June 2021



ANH2021

Agriculture, Nutrition and Health Academy Week

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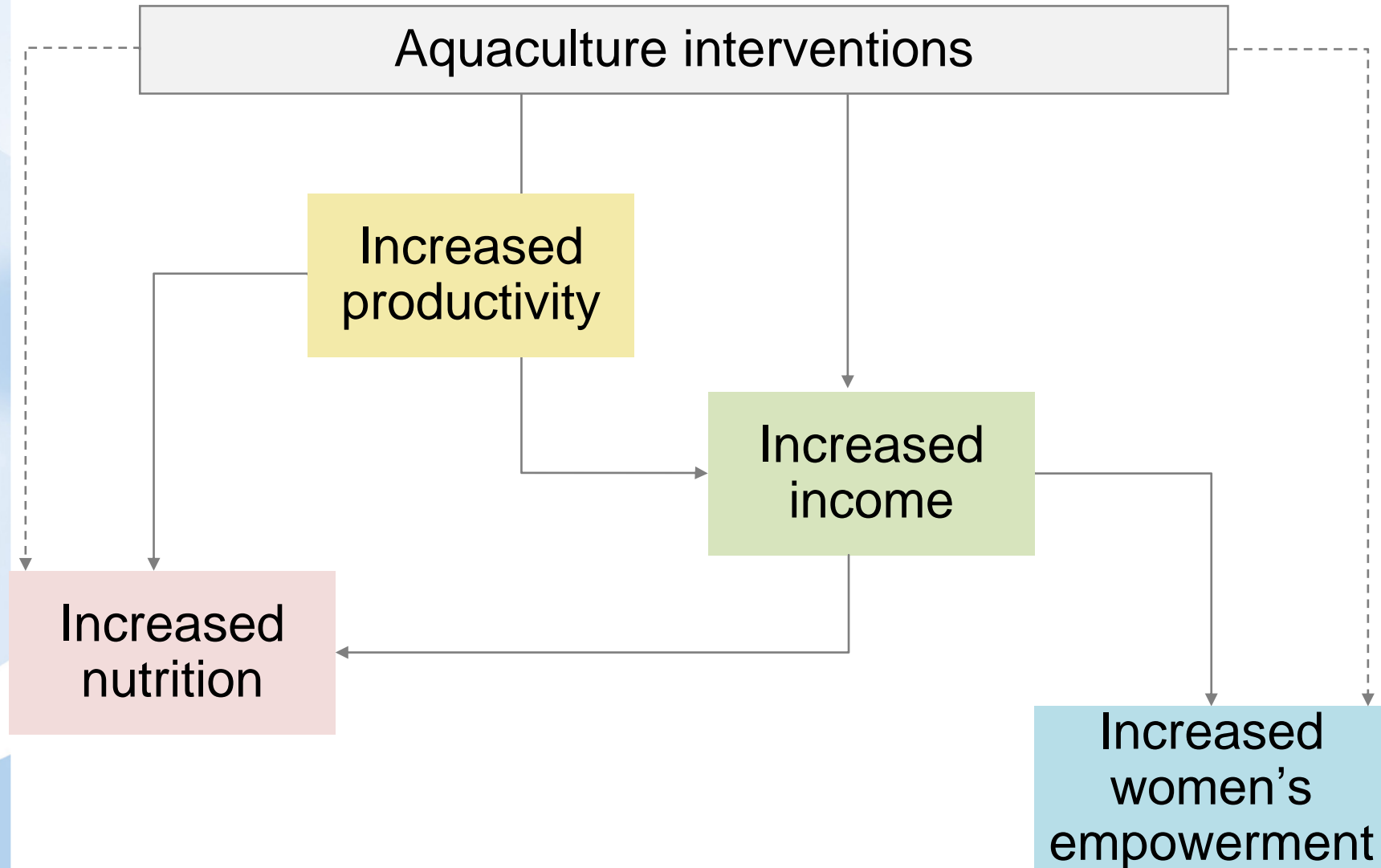
Review Questions

1. Do **aquaculture interventions increase** the productivity, income, nutrition, and empowerment of individuals engaged in aquaculture and their households in L&MICs?
2. Do aquaculture interventions generate income and nutrition **spillover effects** beyond the farmers' households?
3. To what extent **do the effects of aquaculture interventions vary** by intervention type, population group, and location? In particular, to what extent do effects vary by gender?
4. What are the potential **barriers and facilitating factors** that impact the effectiveness of aquaculture interventions?
5. What is the **cost-effectiveness** of different aquaculture interventions focused on productivity, income, nutrition, and empowerment outcomes?

Review Questions

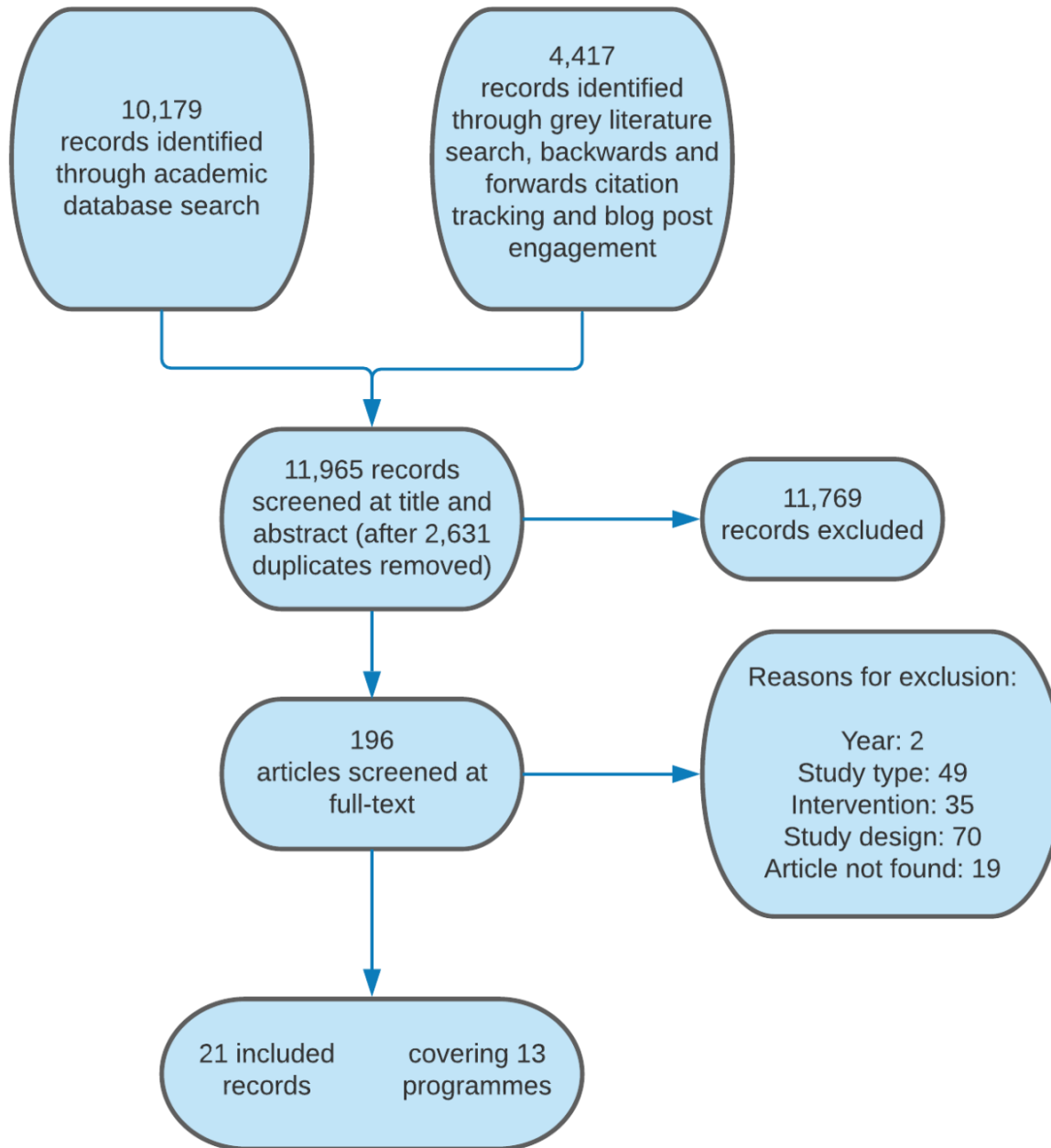
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Theory of Change

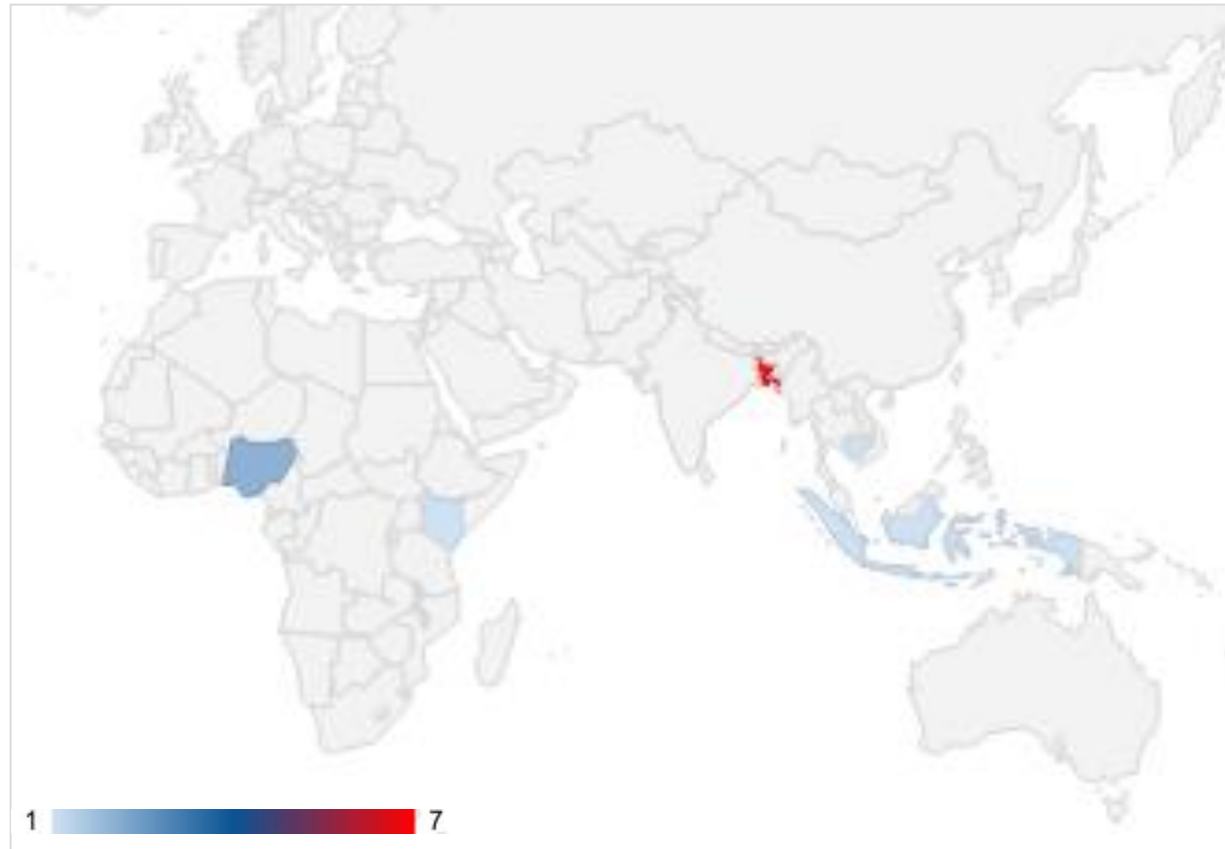


Inclusion criteria

Population	<ul style="list-style-type: none">• Individuals, households, villages, municipalities, or community-based organisations based in a L&MIC.• No restriction on the location of the study in terms of rural or urban areas and no demographic restrictions.
Interventions	<ul style="list-style-type: none">• Any project, programme, or policy that seeks to provide new and/or improved aquaculture activities related to farming fish and other aquatic organisms (e.g. seaweed), based on ponds, cages, and other aquaculture systems, involving land-based and water-based aquaculture, and covering the various stages of its value chain for which there is relevant evidence.
Comparison	<ul style="list-style-type: none">• Any type of comparison group (i.e. business as usual, a different aquaculture intervention).
Outcomes	<ul style="list-style-type: none">• Primary outcomes: production, income, nutrition and empowerment.• Secondary outcomes: Any other outcome reported.
Studies	<ul style="list-style-type: none">• Evaluations that use an experimental or quasi- experimental design to robustly measure a change in outcomes that is attributed to an intervention as is compared to an appropriate counterfactual.
Other criteria	<ul style="list-style-type: none">• Studies published in any language.• Studies published from 1980.• Studies under any publication status.• Studies with any length of follow-up periods.



Programme Characteristics



Asia

Bangladesh (n = 7)

Cambodia (n = 1)

Indonesia (n = 1)

Africa

Nigeria (n = 2)

Kenya (n = 1)

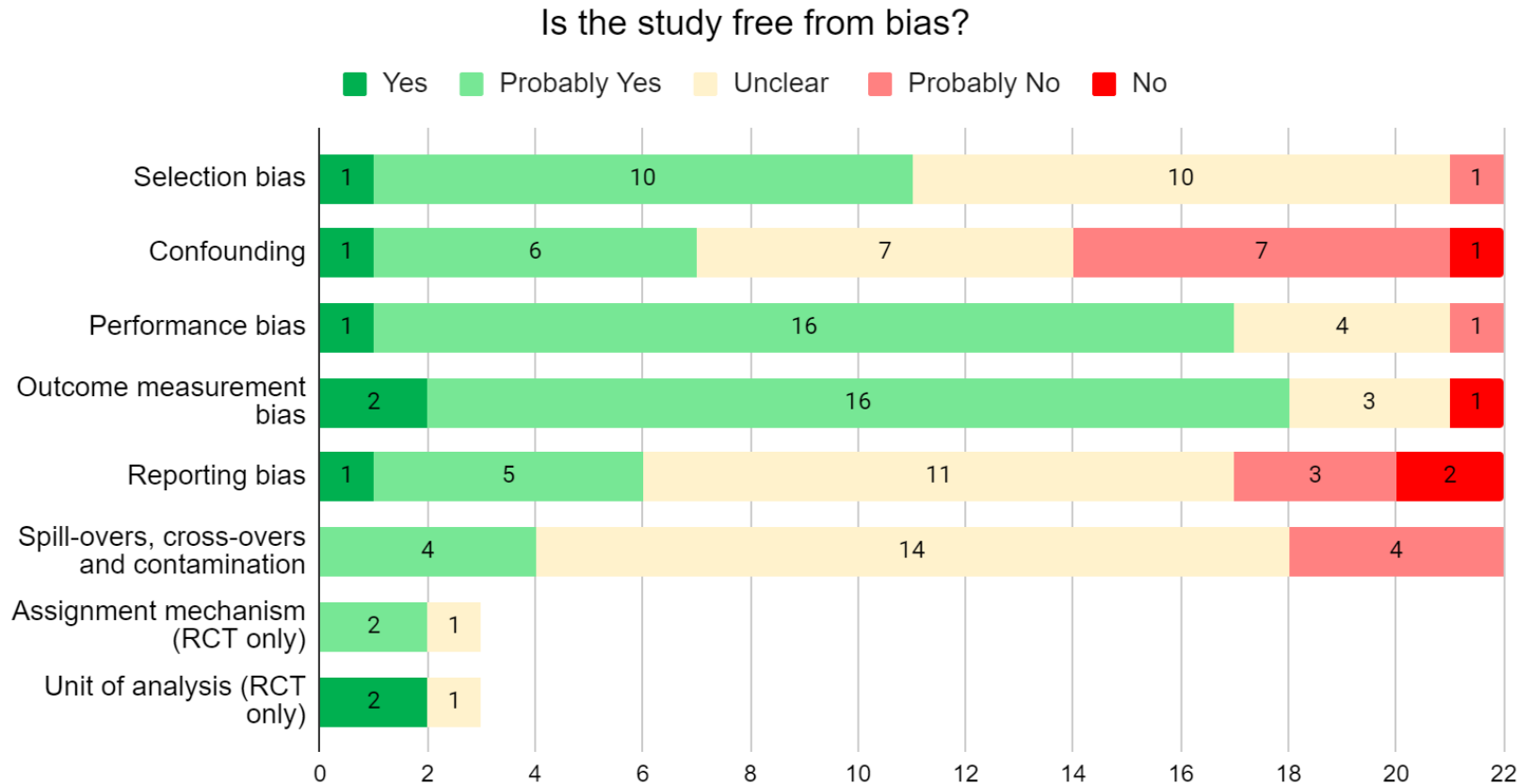
Malawi (n = 1)

Programme Characteristics

Programme	Programme scope		Value chain components						ToC pathways			
	Scale	System	Training	Technology Provision	Direct Resources	Credit	Technical Assistance	Post-production Support	Productivity	Income	Nutrition	Women's empowerment
AFP	Sub-national	Rice fields	✓	✓	✓	✓		✓	✓	✓		✓
BS	Local	Ponds	✓	✓		✓	✓		✓	✓	✓	✓
CBFC	Sub-national	Seasonal floodplains		✓	✓				✓	✓		
DSAP	Sub-national	Ponds, rice fields	✓	✓		✓	✓		✓	✓		
ESP	Sub-national	Ponds		✓	✓	✓			✓	✓		
Fadama II	Sub-national	Ponds	✓	✓				✓	✓	✓		
Fadama III	National	Ponds	✓	✓	✓				✓	✓		
FoF	Local	Ponds	✓	✓	✓		✓		✓	✓	✓	✓
GNAEP	Sub-national	Ponds, cages	✓	✓		✓		✓	✓	✓		✓
IAA	Sub-national	Ponds	✓	✓					✓	✓		
MAEP	Sub-national	Ponds	✓	✓	✓	✓	✓		✓	✓		✓
SAFAL	Sub-national	Ponds	✓	✓				✓	✓	✓	✓	
SMART-Fish	Sub-national	Ponds, cages	✓	✓	✓		✓	✓	✓	✓		

Meta-analysis: Effectiveness of aquaculture interventions

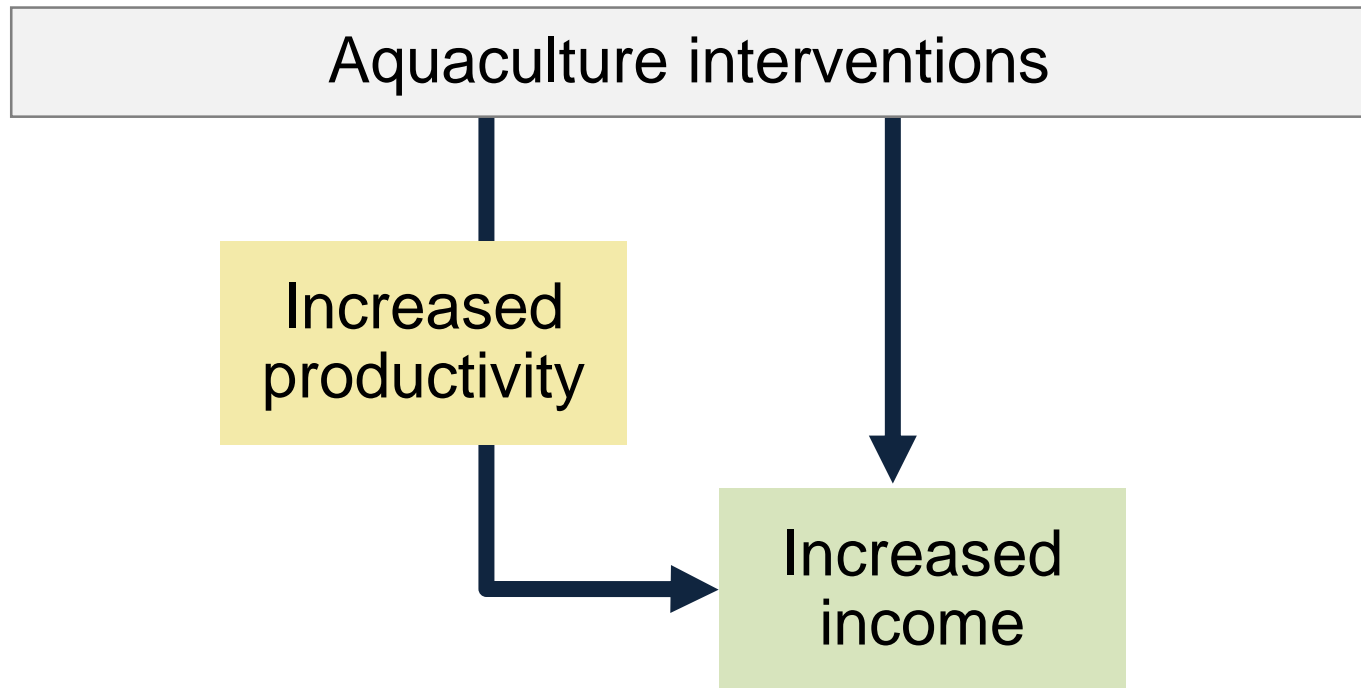
Risk of Bias



Effectiveness evidence

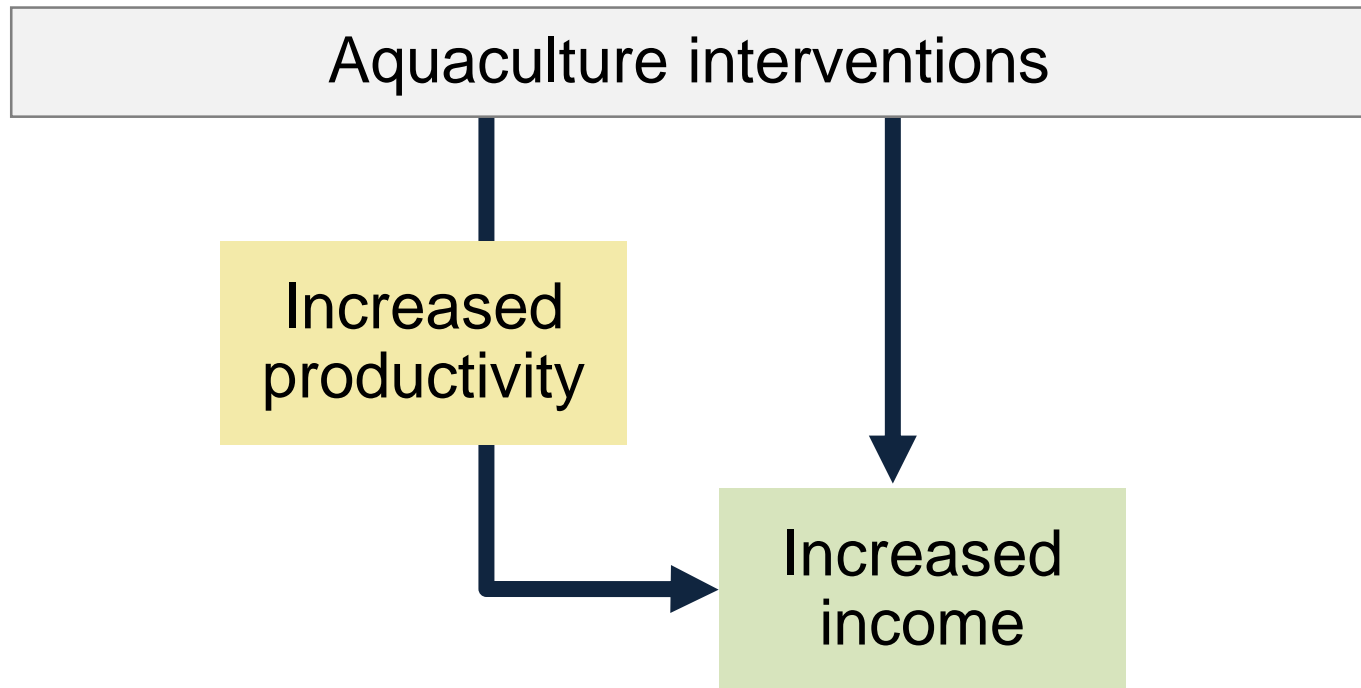
Aquaculture interventions

Effectiveness evidence

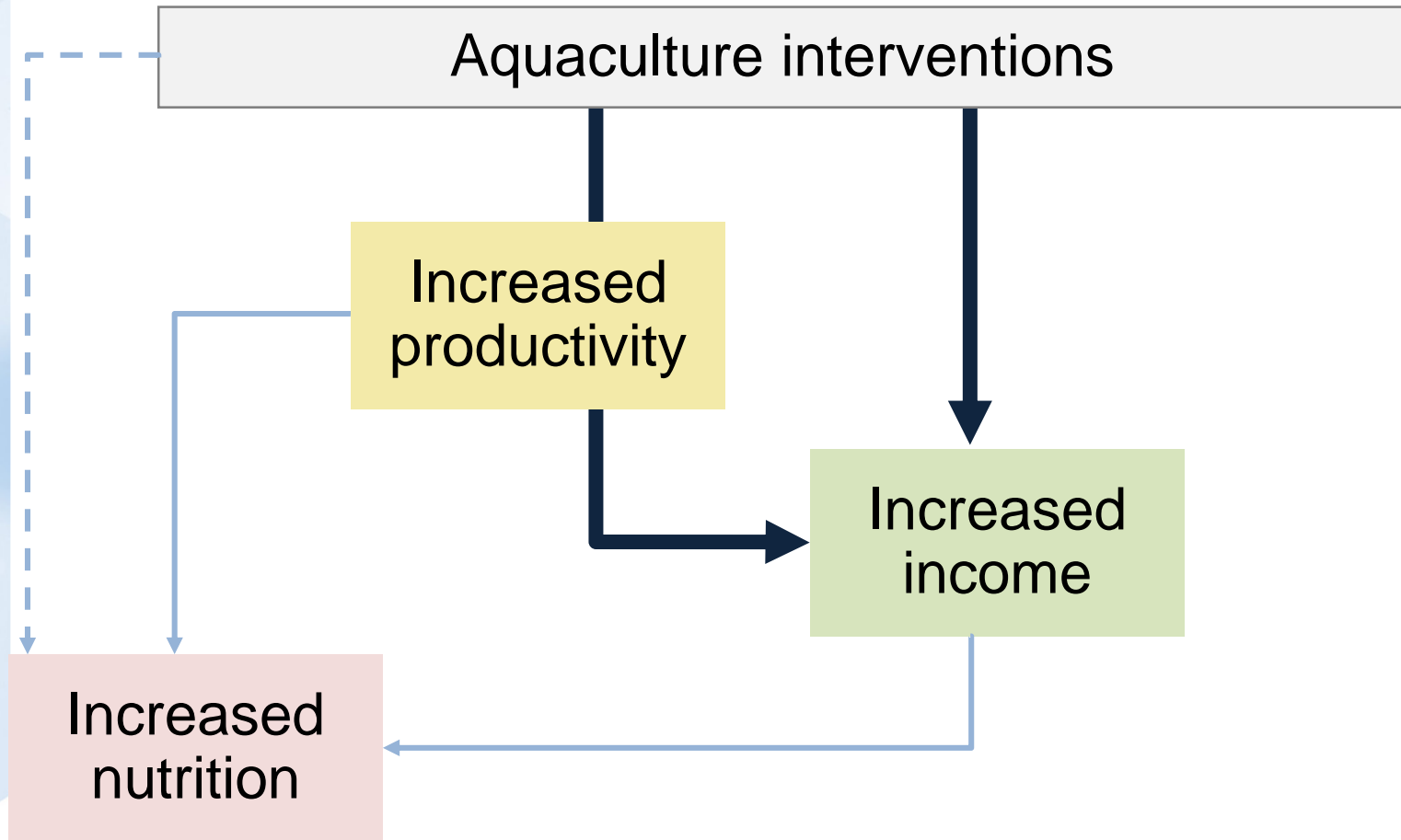


	Outcomes	SMD	95% CI	I ²	# Programmes
Productivity group	Production value	0.19	[0.08, 0.30]	32.8	4
	Production volume	0.26	[-0.15, 0.66]	7.6	3
	Production quality				1
Income group	Income	0.24	[0.11, 0.37]	28.4	10
	Total HH expenditure	0.16	[0.01, 0.31]	56.7	5
	Farm profit	0.15	[-0.03, 0.33]	3.6	3
	Poverty	0.23	[-0.21, 0.66]	8.6	2
	Food expenditure	0.16	[-0.00, 0.32]	0.8	2
	HH assets	0.04	[-0.38, 0.45]	80.5	2
	Farm revenue				1
	Market participation				1
Prices				1	

Effectiveness evidence

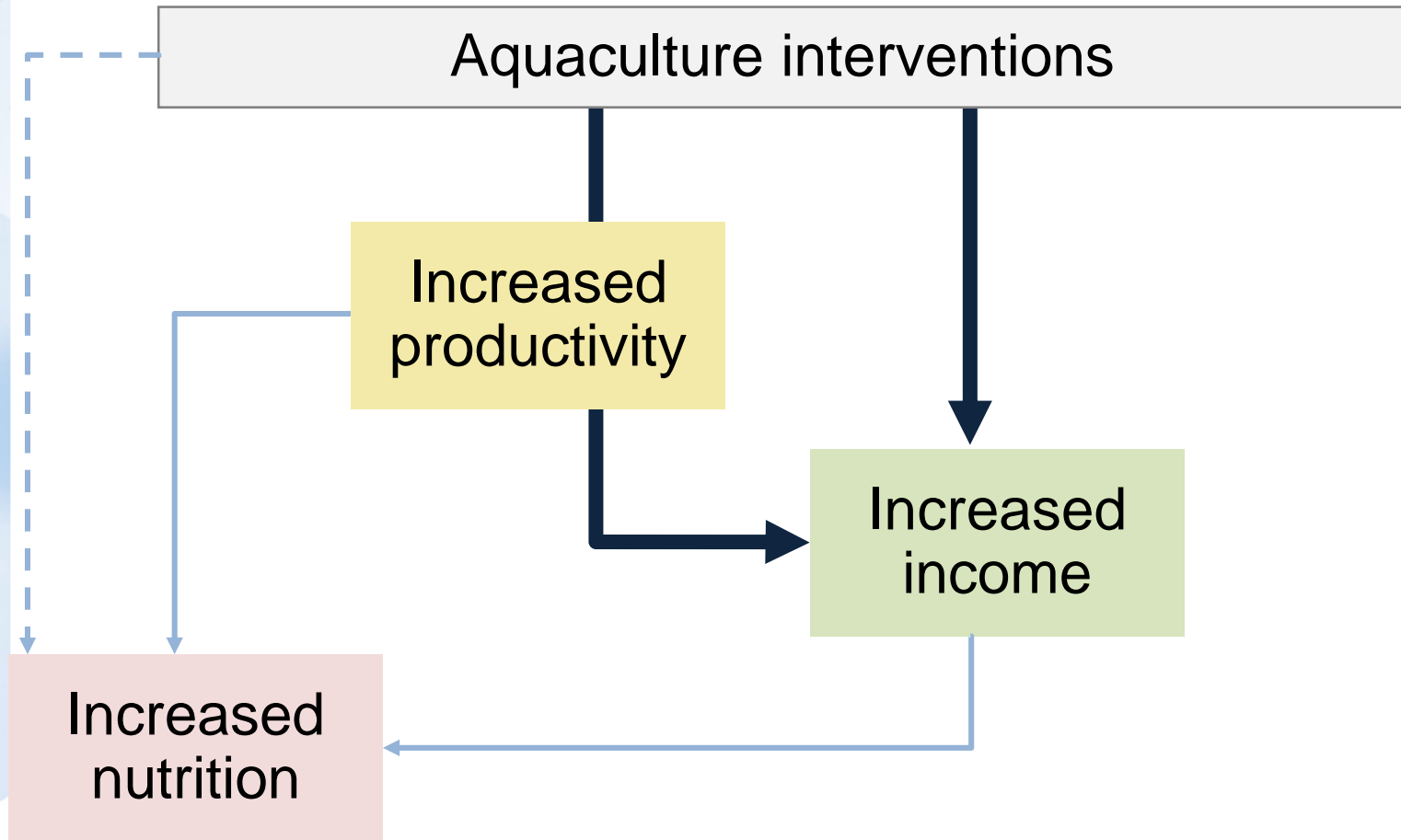


Effectiveness evidence

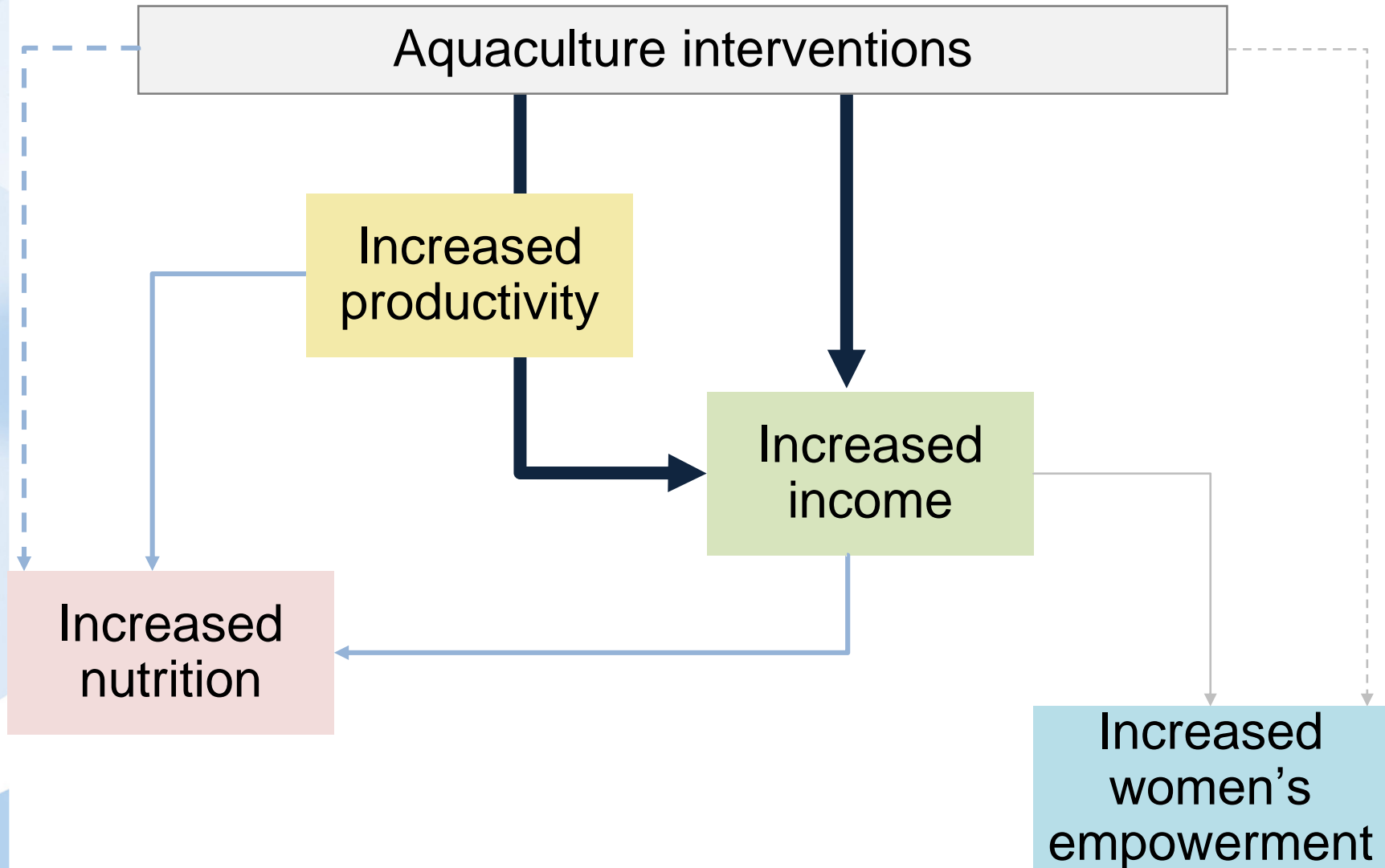


	Outcomes	SMD	95% CI	I ²	# Programmes
Nutrition group	Women's BMI	0.07	[-0.09, 0.22]	2.8	3
	Children's height-for-age	0.05	[-0.07, 0.17]	0.0	3
	Men's BMI	0.07	[-0.12, 0.25]	0.0	2
	Fish consumption	0.30	[0.14, 0.46]	0.6	2
	Food security				1
	Blood concentration				1
	Micronutrients intake				1

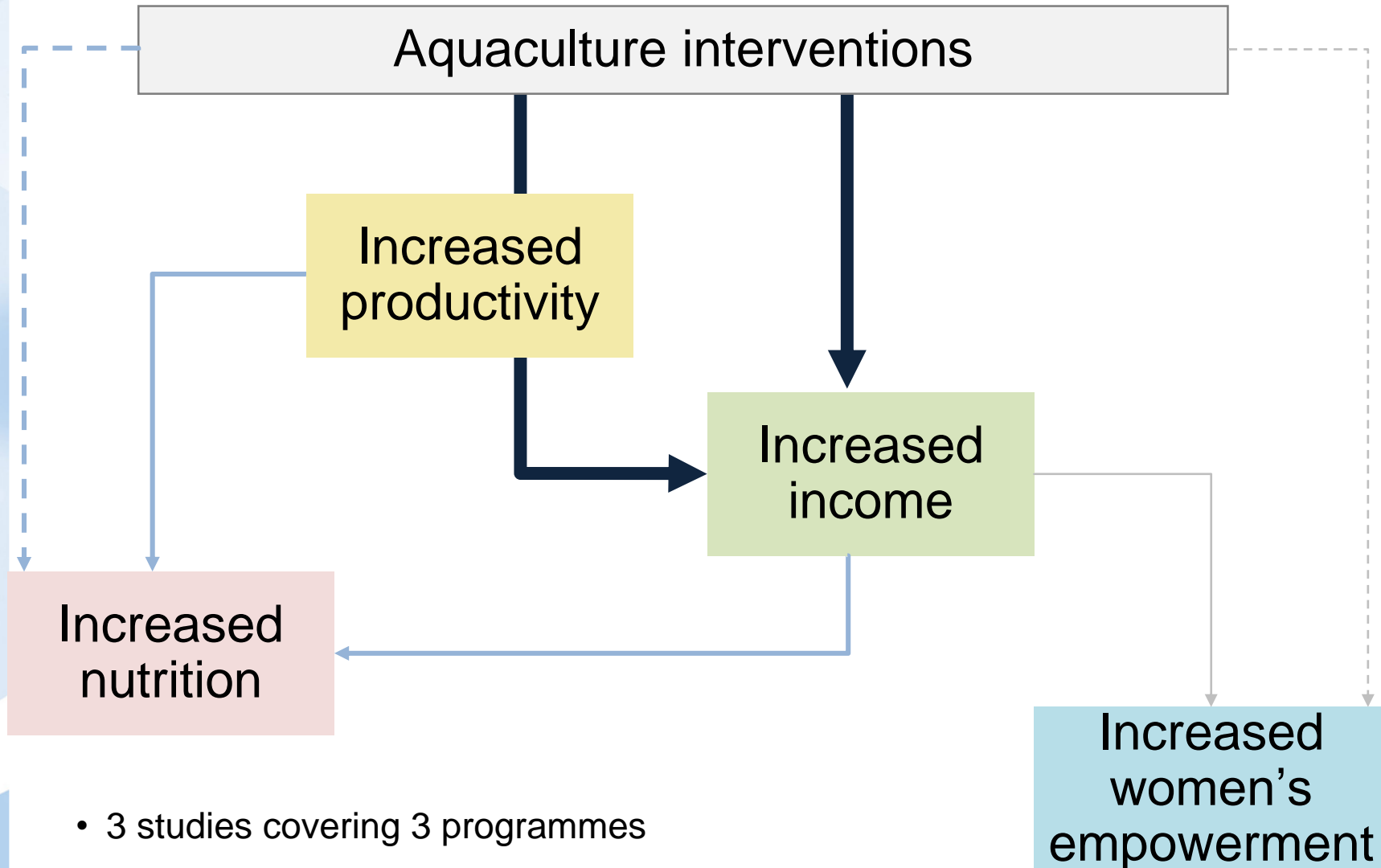
Effectiveness evidence



Effectiveness evidence



Effectiveness evidence



- 3 studies covering 3 programmes
- Outcomes too dissimilar to synthesise
- Mixed results and context-specific

Key issues and implications

- There is a paucity of impact evaluations, and not necessarily of aquaculture programmes.
- Several challenges from the set of included studies.
- Not sufficient information to fully answer our research questions.
- Promotion of reporting standards for new evaluations.

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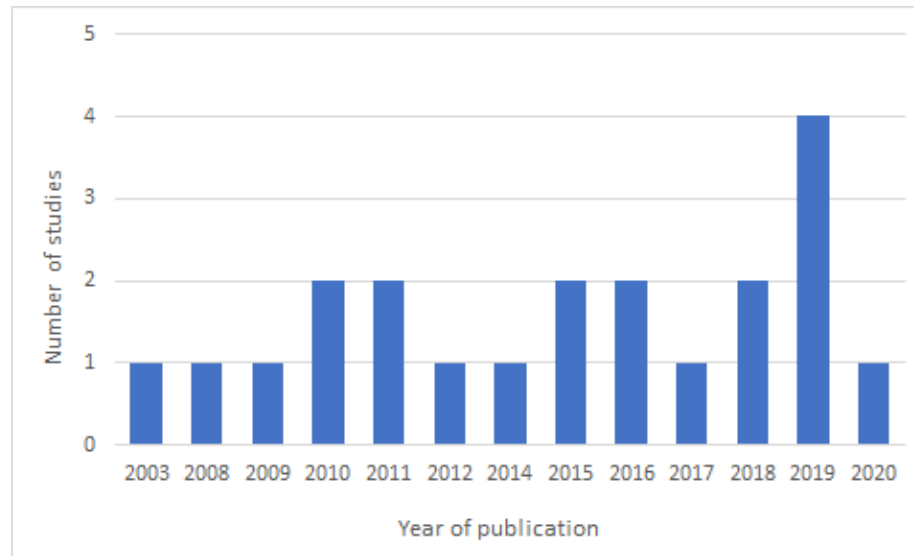
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Included studies & programmes

Project	Country	Paper(s)
Adivasi Fisheries Project (AFP)	Bangladesh	Saiful 2015a, Saiful 2015b
Community Based Fish Culture in Seasonal Floodplains and Irrigation Systems (CBFC)	Bangladesh	Haque 2017, Haque 2016
Development of Sustainable Aquaculture Project (DSAP)	Bangladesh	Khondker 2011
Mymensingh Aquaculture Extension Project (MAEP)	Bangladesh	Rand 2009, Danida 2008, Quisumbing 2011, Hallman 2003, Kumar 2010
Greater Noakhali Aquaculture Extension Project (GNAEP)	Bangladesh	Danida 2008
NGO Banchte Shekha (BS)	Bangladesh	Quisumbing 2011, Hallman 2003, Kumar 2010
Sustainable Agriculture, Food Security and Linkages Project (SAFAL)	Bangladesh	Kuijpers 2020, Kuijpers 2019
Economic Stimulus Programme (ESP)	Kenya	Amankwah 2018, Amankwah 2016
Fadama II	Nigeria	Akinlade 2012
Fadama III	Nigeria	Alawode 2019
Fish on Farms (FoF)	Cambodia	Michaux 2019, Verbowski 2018, Talukder 2014
SMART-Fish	Indonesia	Cahyadi 2019
WorldFish Integrated Aquaculture-Agriculture Dissemination (IAA)	Malawi	Dey 2010

Studies Characteristics



Publication status:

- Journal article (n = 13)
- Working paper (n = 3)
- Institutional report (n = 3)
- Dissertation (n = 1)
- Conference paper (n = 1)

Study design:

- PSM (n = 8)
- PSM + DiD (n = 8)
- RCT (n = 3)
- IV (n = 1)
- ANOVA (n = 1)

Barriers and facilitators and cost-effectiveness of aquaculture interventions

Barriers, facilitators, and cost-effectiveness

- Second search, but did not find much additional information from included programmes.
- Three dimensions of barriers and facilitating factors:
 - programme set up
 - participation of beneficiaries
 - level of productive activities
- An increased frequency, quality, and regularity of support from interventions could affect the motivation of participants to maintain their involvement in aquaculture activities.
- Cost data was usually not available, we could only compare some programmes in Bangladesh.

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