Department for Evaluation

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Mapping and Evidence Synthesis of Process Evaluations of Climate Adaptation in Food Production

Synthesis Report

The report is commissioned by the Department for Evaluation in Norad

The Department for Evaluation is responsible for conducting independent evaluations of activities funded over the ODA budget. The department is governed under a separate mandate and associated strategy issued by the Norwegian Ministry of Foreign Affairs and the Ministry of Climate and Environment. The department reports directly to the Secretary Generals of these two ministries.

The report is carried out by American Institutes for Research (AIR)

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Foreword

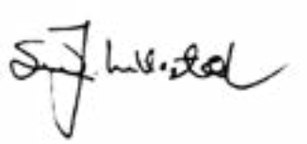
Fighting hunger and increasing global food security are central to the Norwegian Government's Food Security Strategy, launched in November 2022 with the goal of ensuring that the world's poor have access to sufficient safe and nutritious food, which meets their dietary needs and food preferences, to live active and healthy lives.

The Food Security Strategy also stresses the importance of integrating development and climate efforts. Food production must change to lower its carbon footprint and environmental impact, as well as to increase its resilience to climate change.

The strategy is intended to increase local climate-resilient food production, increase local value creation and incomes for food producers, and reduce malnutrition and the scale of hunger crises. Norway is partnering with multilateral organizations and non-governmental organizations to achieve long-term improvements in food security and crisis prevention.

This synthesis report has mapped and collated evidence from process evaluations of climate adaptation in food security interventions, from key Norwegian food security partners, with the aim of making this evidence readily available to help administrators of Norwegian aid in their efforts to implement the Norwegian Food Security Strategy. The report may also be of interest to other donors and partners interested in learning about what facilitates and what hinders climate adaptation in food security interventions in low-income countries.

We would like to thank the synthesis team from the American Institutes for Research for a job well done. We would also like to thank external expert Dr Karen Daniels for her expert advice to the Department for Evaluation throughout the synthesis process.



Siv Janne Lillestøl

Oslo, March 2024

Acting Director, Department for Evaluation

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Acronyms

International Initiative for Impact Evaluation	3ie
American Institutes for Research	AIR
Critical Appraisal Skills Program	CASP
Conservation Agriculture Scaling Up	CASU
Community-Based Organization	CBO
Consultative Group for International Agricultural Research	CGIAR
Climate-Smart Agriculture	CSA
European Union	EU
Food and Agriculture Organization of the United Nations	FAO
Foreign, Commonwealth & Development Office	FCDO
Confidence in Evidence from Reviews of Qualitative Research	CERQual
International Fund for Agricultural Development	IFAD
Intergovernmental Authority on Development in Eastern Africa	IGAD
Intergovernmental Panel on Climate Change	IPCC
Norwegian Agency for Development Cooperation	Norad
Organisation for Economic Co-operation/Development Assistance Committee	OECD/DAC
Population, Intervention, Comparison, Outcomes	PICO
Population/Phenomenon of Interest, Intervention, and Evaluation	PIE
Village Savings and Loan Association	VSLA
World Food Programme	WFP

Executive summary

Food production affects the environment and is itself affected by weather extremes and climate change. As a result of climate change, both food security and environmental crises have become a major concern worldwide, particularly affecting vulnerable groups in the Global South. Small-scale producers (e.g., farmers and fishers) must adapt their activities and adopt innovative, climate-smart practices to mitigate these crises. The Evaluation Department in the Norwegian Agency for Development Cooperation (Norad) commissioned the American Institutes for Research® (AIR®) to conduct an evidence synthesis of climate adaptation in food production interventions. The purpose of this study is 1) to build the evidence base on the implementation of climate adaptation in food production interventions by synthesizing existing evidence from process evaluations undertaken by key food security partners of Norad, and 2) to learn more about how the same key partners conduct evaluations on this topic. The first phase of the study included a systematic database search, critical appraisal, and mapping of identified process evaluations. The second phase entailed synthesizing the data from the included process evaluations to identify barriers and facilitators to climate adaptation in food production. This report presents the findings from both phases of the work.

Three main questions guided the study:
Synthesize findings from the mapped evaluations on the barriers and facilitators to successful implementation of climate adaptation in food production

1. *What is the extent, nature, and quality of the existing evidence on the implementation of climate adaptation in food production interventions undertaken by Norad's food security partners?*
2. *What types of issues do these evaluations aim to uncover, who are the target groups, and to what extent are indigenous groups and/or disadvantaged populations included?*
3. *What works and what does not work for successful implementation (including implementation fidelity) of the climate-adaptive food production interventions?*

Objective of the mapping:
Map process evaluations of climate adaptation in food production interventions commissioned by Norwegian food security partners to examine the *extent, range, and nature of the available evidence*

Objective of the synthesis:
Synthesize findings from the mapped evaluations on the *barriers and facilitators to successful implementation* of climate adaptation in food production

Research Methods

We conducted a systematic search of four scholarly and 23 practitioner databases to collect process evaluations using qualitative, quantitative, or mixed methods. To identify relevant studies, we applied the Problem/Phenomenon of Interest, Intervention, and Evaluation (PIE) framework to our searches and further compared the search results to the study's inclusion criteria, which were determined in coordination with Norad. We further assessed the methodological quality of the studies using an adapted version of the Critical Appraisal Skills Program (CASP) checklist. The searches returned 1,627 articles, of which 70 met the inclusion criteria and critical appraisal standard.

To conduct the evidence synthesis, we first evidence extracted relevant data from the evaluations using NVivo software and a deductive coding framework based on the study's conceptual framework.

Researchers also inductively identified new themes emerging from the data during the coding process. For a subset of key findings (20 of 42 total findings), we then used the GRADE-CERQual (Confidence in the Evidence from Reviews of Qualitative Research) approach to assess how much confidence to place in the review finding.

Key limitations stemming from the research process include the limited extent of the synthesized evaluations due to the study's inclusion criteria; the insufficient contextual knowledge pertaining to the study contexts on the part of the AIR team; and the subjectivity introduced by researchers in interpreting 'key' findings.

Evaluation Mapping Results

We identified 70 process evaluations of climate adaptation in food production interventions for small-scale food producers and fishers in low- and middle-income countries that were commissioned by Norad's key partners. All 70 evaluations were critically appraised and determined to be of sufficient quality to warrant inclusion in the synthesis phase. Most of the evaluations came from sub-Saharan Africa (50) relative to regions like East Asia & Pacific (7). Most focused on crop production (55), as opposed to livestock (8) or fisheries (7).

In addition, most of the evaluations examined social adaptations (i.e., educational, informational, or behavior-based interventions). Fewer interventions included structural/physical or institutional adaptations; this absence of necessary structural or policy support to facilitate social adaptations often hindered their sustainability. There are key gaps in evidence on aquaculture/fisheries and livestock and from outside sub-Saharan Africa, and a dearth of process evaluations that are embedded in impact evaluations, which would allow for triangulation between implementation and causal inference. When undertaken together, impact and process evaluations enable a more thorough understanding of how program implementation affects intended outcomes (Dixon & Bamberger, 2022). While process evaluations provide valuable insight, without impact evaluations we are not able to triangulate implementation information with the casual effects of programs.

Photo: **Marthe Lid** | Norad

Key Findings from Evidence Synthesis

We present the evidence synthesis findings according to four of the Organisation for Economic Co-operation and Development's Development Assistance Committee's (OECD/DAC) international criteria for evaluation: relevance, efficiency, effectiveness, and sustainability. Below, we present several illustrative findings for each criterion.

Relevance

- Limited understanding of local context and failure to consult with program participants reduced the relevance of climate adaptation activities.
- The need for farmers and pastoralists/ agropastoralists to own land excluded the poorest participants, including disadvantaged groups such as women and youth.
- Programs designed and implemented using participatory approaches were most relevant to participants, including indigenous populations.

Efficiency

- Evaluations of crop production interventions found that climate data—which have high potential to help producers—were not well understood by or accessible to all farmers.
- Although the multi-sectoral nature of climate programming necessarily implicates several government and civil society actors, failure to articulate agency roles or identify a coordinating body undermined collaboration, caused delays, and reduced buy-in for programs.
- Private sector partnerships were more likely to emerge when crop production and fisheries interventions worked to strengthen the capacity of producer cooperatives according to a value chain approach.

Effectiveness

- Evaluations of crop production and livestock interventions identified a reluctance on the part of farmers, agropastoralists, and pastoralists to apply improved agricultural techniques such as crop rotation, minimal tilling, mulching, and cover crops. Smallholders' reluctance to apply improved techniques was due to several factors, including the inaccessibility of necessary supplies (including water), the perception that improved technologies are more labor-intensive, and the perceived risk of new methods over traditional farming techniques.
- Evaluations of crop production interventions identified the "learning by doing" approach as a facilitator of uptake for climate-adaptive farming approaches. For example, home gardens and demonstration plots in which program participants could immediately apply what they learned supported their adoption of climate adaptations.
- The limited scale and duration of climate adaptation interventions inhibited achievement of project objectives.

Sustainability

- Evaluations found that programs were unsustainable when participants perceived that activities were not profitable, useful, or a priority for their business.
- Many climate adaptation projects lacked explicit end-of-project transition plans, including limited coordination with partners and participants and as continued technical knowledge among staff.
- Building structures to increase financial viability, including credit options, private partnerships, or other ongoing funding increased the likelihood of sustainability.

Key Conclusions from Evidence Synthesis

Barriers to Climate Adaptation
Climate adaptation interventions that did not incorporate context and needs assessments were less relevant to program participants, encountered many more difficulties during implementation, and were much less likely to be sustainable. The lack of understanding of needs, capacities, and practicalities in many cases meant that projects took fundamentally inappropriate approaches for the context or left significant challenges unaddressed. Some of these difficulties perhaps should have been anticipated by program designers (increased weed growth following application of conservation agriculture approaches, limited access to water), but mitigation measures were absent or insufficient. Ultimately, these difficulties impeded implementation and the achievement of program objectives. The lack of high-quality needs assessments also meant that climate adaptations were not always relevant or useful for project participants. Although evaluated interventions typically targeted vulnerable populations of some sort (low-income, rural, indigenous, landless, or nomadic households), most evaluations failed to systematically incorporate local knowledge outside of participants' experiences with a given intervention.

Facilitators of Climate Adaptation
Climate adaptation interventions that incorporated contextual analyses, needs assessments, and careful consideration of women's roles were far more relevant to participants than those that did not include these elements. Similarly, interventions that incorporated participatory approaches to gather community feedback and inform program adaptations were also perceived as more relevant to participants. Further, demonstrating the value of the climate adaptation (in terms of profitability, increased production) facilitated uptake and buy-in, particularly when positive results were seen quickly. To support producer profitability, effective linkages with the private sector (cooperatives, lenders, and buyers) and support for small-scale producers to create market-quality products using a climate-adaptive approach were important to adoption.

Finally, in addition to the above facilitators, sustainability was contingent on clear transition plans that embedded projects into existing structures, along with built-in mechanisms to support financing—for example, revolving credit or village savings and loan associations (VSLAs)—to continue the adaptation.

Moderators of Climate Adaptation
Evaluations identified key infrastructure and environmental factors that impeded the effectiveness of climate adaptation interventions, including severe weather events, limited water infrastructure and access, and the general inaccessibility of project sites. Not surprisingly, policy environments that were favorable to climate adaptation and more receptive to climate action promoted the implementation of climate-adaptive interventions, while COVID-19-related restrictions and political instability inhibited project implementation and effectiveness. Two important cultural factors—the mobile and migratory nature of participants and pervasive gender norms restricting women's participation in activities—also moderated the effectiveness of interventions. Finally, inflation and changes in prices for key inputs such as livestock and seeds were the primary economic factors perceived to hinder the effectiveness and sustainability of climate adaptation approaches.

Recommendations for Future Synthesis Research

The findings of the study indicate how future evidence syntheses might help fill persistent evidence gaps. In particular, the researchers recommend conducting qualitative evidence synthesis focused on the following bodies of evidence:

1. Process evaluations commissioned by non-Norad partners, to potentially include greater geographic diversity and a wider range of adaptation approaches.
2. Evidence related to specific climate adaptation approaches (e.g., conservation agriculture or the dissemination of agroclimatic information), to generate a deeper understanding of barriers and facilitators by adaptation type.
3. Evaluations of climate adaptations that incorporated recognized methods for incorporating local knowledge, to identify best practices in doing so.
4. Evidence on the costs and profitability of various climate adaptation approaches, to understand whether certain types of climate adaptations are more profitable than others.

Document Roadmap

We begin the report with a more detailed introduction to the study, background, and context. We then present the research design, including the conceptual framework and the methodology used to identify, map, and synthesize studies. Next, we present the results from the mapping and the evidence synthesis, concluding with a discussion of our findings and recommendations for future research.

1

Introduction

This study used a systematic review methodology to synthesize the evidence from Norad's key partners regarding their implementation of climate adaption and mitigation in food production interventions. The purpose of the study is to identify, analyze, and consolidate evidence from process evaluations, documenting the barriers and facilitators to successful implementation. Our research design combines a systematic database search, critical appraisal, mapping of identified process evaluations, and synthesis of qualitative and quantitative process evaluation evidence that meets quality inclusion criteria.

The study scope includes the review of any research that is or includes a process evaluation of an intervention focused on small-scale food producers and fishers. The process evaluations must explain why implementation failed or succeeded by identifying barriers and facilitators to successful implementation. Evaluations must be published between 2010 and 2022 and commissioned by Norway's key partners (regardless of where the funding comes from) to be eligible for inclusion. This report presents the study background and conceptual framework, followed by the methodological approach to and results from the evidence mapping.

Background and Context

Food production is a central figure in discussions of global food security. According to Intergovernmental Panel on Climate Change (IPCC) scientists (Mbow et al., 2019), climate change will depress crop production in the 21st century, leading cereal prices to increase by, on average, 7% by 2050. Declining production and rising prices will disproportionately affect tropical climates (e.g., sub-Saharan Africa, Middle East) which experience higher climate vulnerability (Mbow et al., 2019). For this reason, local and global policy makers aiming to reduce the risks to livelihoods and food insecurity in the Global South have looked to climate adaptation in food production interventions as a tactic for mitigating the effects of climate change.

Food production interventions target the inputs (e.g., seeds, fertilizer, livestock breeds, soil, water) and methods (e.g., irrigation, agroforestry, mechanization) used to produce food (Fanzo et al., 2017; FAO, 2008). Because these vary greatly by sector, the FAO (2013) "Climate-Smart Agriculture Sourcebook" broke down possible areas for climate adaptation in food production by sector: crop production, forestry, livestock, and fisheries and aquaculture. Within each domain, the FAO lists dozens of evidence-based interventions that can improve resilience to climate change in food production. As Noble et al. (2014) explained, however, climate adaptations implicate a diversity of sectors and stakeholders at the global, national, and local/producer level. They usefully highlight how climate adaptations, regardless of sector, target *structural and physical, social,* and/or *institutional* aspects of food production. As our conceptual framework outlines, we use these categories to understand the diversity of food production interventions examined in this study.

Some evidence supports the effectiveness of such interventions (Bakker et al., 2021; Freudenreich et al., 2020; Kerr et al., 2019; Mbow et al., 2019). For instance, various impact evaluations show that climate adaptation in food production interventions can improve outcomes related to health, food production, and income for targeted populations (Freudenreich et al., 2020; Kerr et al., 2019). With a focus on nutritional outcomes, Bakker et al. (2021) also highlighted how adaptations such as climate-smart agriculture and climate-resilient livestock can improve the impact of food systems on climate (i.e., greenhouse gas emissions) and vice versa. Indeed, the IPCC (2022a) affirmed the "growing" body of evidence on climate adaptation in the public and private sectors, primarily related to "small incremental, reactive changes to usual practices often after extreme weather events" (p. 71).

Despite this, scientists and policy makers identified two key evidence gaps on this topic. First, a key knowledge gap stems from the novelty and "rapidly evolving" nature of adaptation science (Ara Begum et al., 2022,

p. 134). In their evidence review of climate-smart agriculture (CSA), a popular method of adaptation in food production, Rosenstock et al. (2016) argued that CSA practices lack standardization because they are relatively new as an agricultural practice. Such novelty makes the CSA evidence incoherent and complicates efforts to analyze its effectiveness as an intervention. In 2022, IPCC similarly found a major knowledge gap related to the analysis of climate adaptations; they called for particular focus on "observed adaptation-related responses to climate change, governance and decision making in adaptation, and the role of adaptation in reducing key risks and global-scale reasons for concern" as well as the limits of climate adaptation (Ara Begum et al., 2022, p. 134). As this list indicates, there is a lack of standardized, high-level assessment of adaptations in food production.

Second, there is less evidence on system-level transformation, including on mechanisms for upscaling adaptations that are shown to work at the intervention level (IPCC, 2022a; Moore et al., 2021; FAO, 2008). Particularly because *mal*adaptation can have serious consequences for food security and climate adaptation, IPCC scientists conclude that more evidence is needed to open the "black box" of decision-making surrounding climate adaptation (Ara Begum et al., 2022, p.169). While some evidence on the implementation process surrounding climate adaptation centers on the country context (Mwadzingeni et al., 2022) or intervention type (Aggarwal et al., 2018; Bakhsh et al., 2020; Snapp et al., 2021), many others examine unique interventions (Barrett et al., 2020). As these studies indicate, the implementation evidence is fragmented and lacks centralization.

In the effort to generate evidence on climate adaptations to food systems interventions, process evaluations constitute a key—and largely untapped—body of knowledge. By examining elements like the underlying causal model, design, and contextual factors affecting implementation, process evaluations document the degree to which interventions (a) are implemented as planned, (b) reach the intended target audience(s), and (c) produce their desired outputs (Boothroyd, 2018; Dixon and Bamberger, 2022). Implementers, donors, and other key stakeholders usually commission process evaluations to get valuable feedback on the quality and accuracy of an intervention, information which helps them conclude whether the intervention alone is "a necessary and sufficient cause of the observed changes" (Dixon and Bamberger, 2022, p. 6). Through mixed or purely qualitative research methods, researchers examine aspects such as the intervention's design and problem assessment, staffing and management practices, beneficiary selection, intervention uptake, monitoring mechanisms, coordination with stakeholders, and sustainability planning (Dixon and Bamberger, 2022). In this way, process evaluations can generate valuable evidence on the effectiveness and wider applicability of climate adaptations in food systems interventions—as well as the institutional mechanisms enabling (or hindering) their implementation.

In building on the existing evidence base, this study turns to process evaluations to generate new evidence on climate-adapted food production interventions. The study will map process evaluations and synthesize findings across discrete interventions. In so doing, it will illustrate the landscape of available evidence related to climate adaptations in food production and it will extract the most salient and conclusive lessons found within this array of process evaluations, all while trying to address the evidence gaps outlined above.

The study aims to support policy makers and practitioners working on food security in the development, humanitarian, and global health spaces as they design and implement food production interventions. Notably, because "adaptation … pathways need to be tailored to the context and the nature of the farming system," this evidence synthesis will not aim to suggest a single, best method of adaptation (Dinesh et al., 2018; FAO, 2008). Rather, by mapping and synthesizing evidence, it will give decision makers additional tools with which to make contextualized policy and programming decisions and it will suggest areas in which additional evidence might support decisions around climate adaptation.

2

Synthesis and Mapping Design

This section presents the conceptual framework underpinning the study, the detailed methodology used for the mapping and evidence synthesis, and the main limitations of the study.

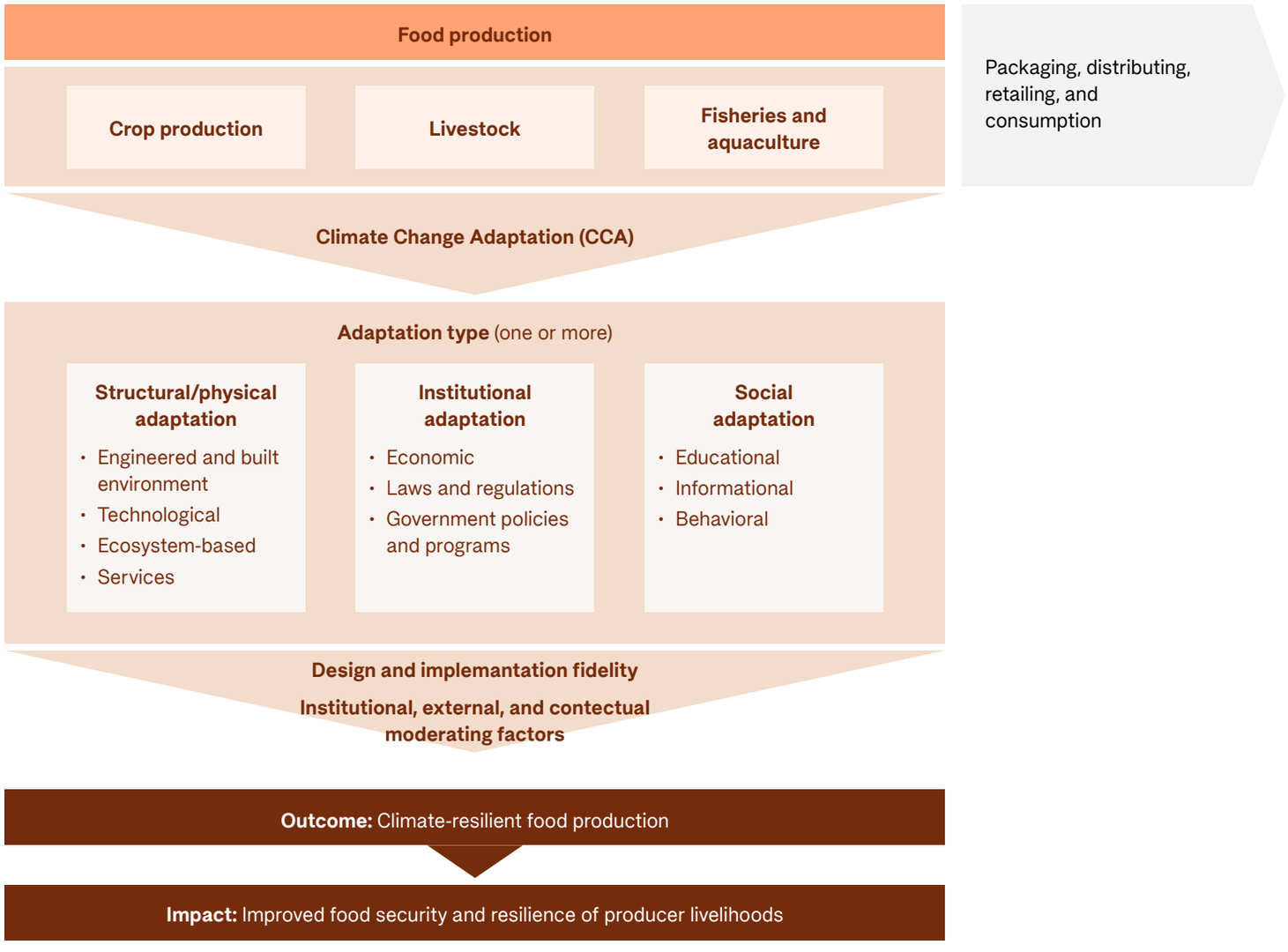
Conceptual Framework

We created a conceptual framework to guide the database search, evaluation mapping, and evaluation synthesis. The framework considers climate adaptation in food production interventions for small-scale farmers and fishers in low- and middle-income countries according to the literature and the parameters of this study. Figure 1 shows our conceptual framework, which we elaborate below.

Climate Adaptation-Focused Food Production Interventions. Although the components of a food systems value chain can vary by sector, the value chain generally includes production, processing, distribution, and consumption (Fanzo et al., 2017). For this study, we focus specifically on interventions in either crop production, livestock production, or fisheries and aquaculture that pertain to the **production** stage of the value chain, including inputs (e.g., seeds, fertilizer, livestock breeds, soil, water) and methods (e.g., irrigation, agroforestry, mechanization) used to produce food (Fanzo et al., 2017; FAO, 2008).

FIGURE 1

Working Conceptual Framework



We focus on climate **adaptation**, which is "the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities" (IPCC 2022b, p. 134).[1] We adopt Noble et al. (2014)'s framework of adaptations, which includes (a) structural or physical adaptations (e.g., genetic techniques), (b) social adaptations (e.g., community-based adaptation), or (c) institutional adaptations (e.g., warning systems). Table 1 shows the types of adaptations that papers in our review covered by adaptation type for each of the intervention areas.

The framework (Noble et al., 2014, p. 845) lists examples of the types of potential climate adaptation strategies that apply under each of these categories for crop, livestock, and fisheries food production. These focus on **supply-side** climate adaptation strategies—that is, interventions that address food production as opposed to demand-driven interventions, which might include food choices for health and sustainability. Central to these adaptations is direct engagement with program beneficiaries (i.e., producers) because adaptations are only successful when producers feel that their needs are addressed and that the adaptation facilitates their existing work. For this reason, producers' perspectives and level

1 This review will exclude studies focused purely on mitigation strategies, although with the high overlap between climate change adaptation and mitigation strategies, it is possible that some studies will include adaptation approaches that also help with mitigation (see IPCC 2022 Chapter 5 for discussion on trade-offs and synergies between approaches to adaptation and mitigation).

TABLE 1

Search Databases

Adaptation types	Crop production	Fisheries/aquaculture	Livestock
Social	Farmer field schools; training on techniques such as crop diversification and intercropping, use of natural resources, community seed banks, adaptation planning, resilience building	Awareness raising about ecosystem preservation, quality fodder	Use of drought early warning systems; introduction of resilient technologies such as haymaking; disease surveillance and veterinary service capacity
Structural/ physical	Construction of dams and irrigation schemes; infrastructure rehab and construction; use of tools such as rain gauges, mobile solar kits	Pond construction; storm and wastewater management; sea walls and coastal protection structures	Construction of watering holes, water storage, and pump storage; new animal varieties
Institutional	Coordination within the Ministry of Agriculture; linkages to microfinance and credit institutions; use of renewables in land use planning; increasing commodity chain linkages; mainstreaming approaches into policy	Support for governance, research management, biosecurity; sustainable systems, including ponds per family; linkages to microfinance and credit institutions; marine protected areas	Strengthening institutional climate risk and adaptation structures; mainstreaming approaches into policy

of engagement are crucial in the choice, design, and application of the adaptation.

Process Indicators. We expect climate adaptation-related crop, livestock, and fisheries interventions within each of these categories to follow a similar implementation model, which process evaluations may assess with various indicators. As such, our framework includes a combination of relevant process indicators drawn from Dixon and Bamberger (2022), IPCC (2022b), and the international criteria for evaluation adopted by the DAC of the OECD. Dixon and Bamberger (2022) outline four main elements of a process evaluation: (a) design, (b) implementation, (c) institutional aspects, and (d) external and contextual factors. Factors of an intervention **design** include problem analysis, a theory of change, relevance to the population, planning, and feasibility. **Implementation** factors include awareness, relevance, effectiveness, coherence, efficiency, sustainability, and monitoring. The barriers and facilitators to each of these aspects determine the relative success of an intervention at meeting its intermediate and final outcomes.

We consider elements (c) and (d) of the above process indicator framework to be moderators, or contextual factors that may affect implementation. **Moderators** are independent of the intervention. These could be **institutional aspects**, such as coordination and operational performance, or **other external and contextual factors**, such as governance; infrastructure; weather patterns; natural disasters; socio-political context (e.g., conflict, political protests, farmer strikes); culture (e.g., gender roles); participation and engagement; and existing community, government, or other built-in support. External moderators provide context to an intervention's implementation and may also influence fidelity of implementation.

Outcomes. Finally, the conceptual framework specifies climate-resilient food production as the key intermediate outcome for the process focus of the intervention, with the ultimate impacts likely including improved food security, health, and resilience of producer livelihoods.

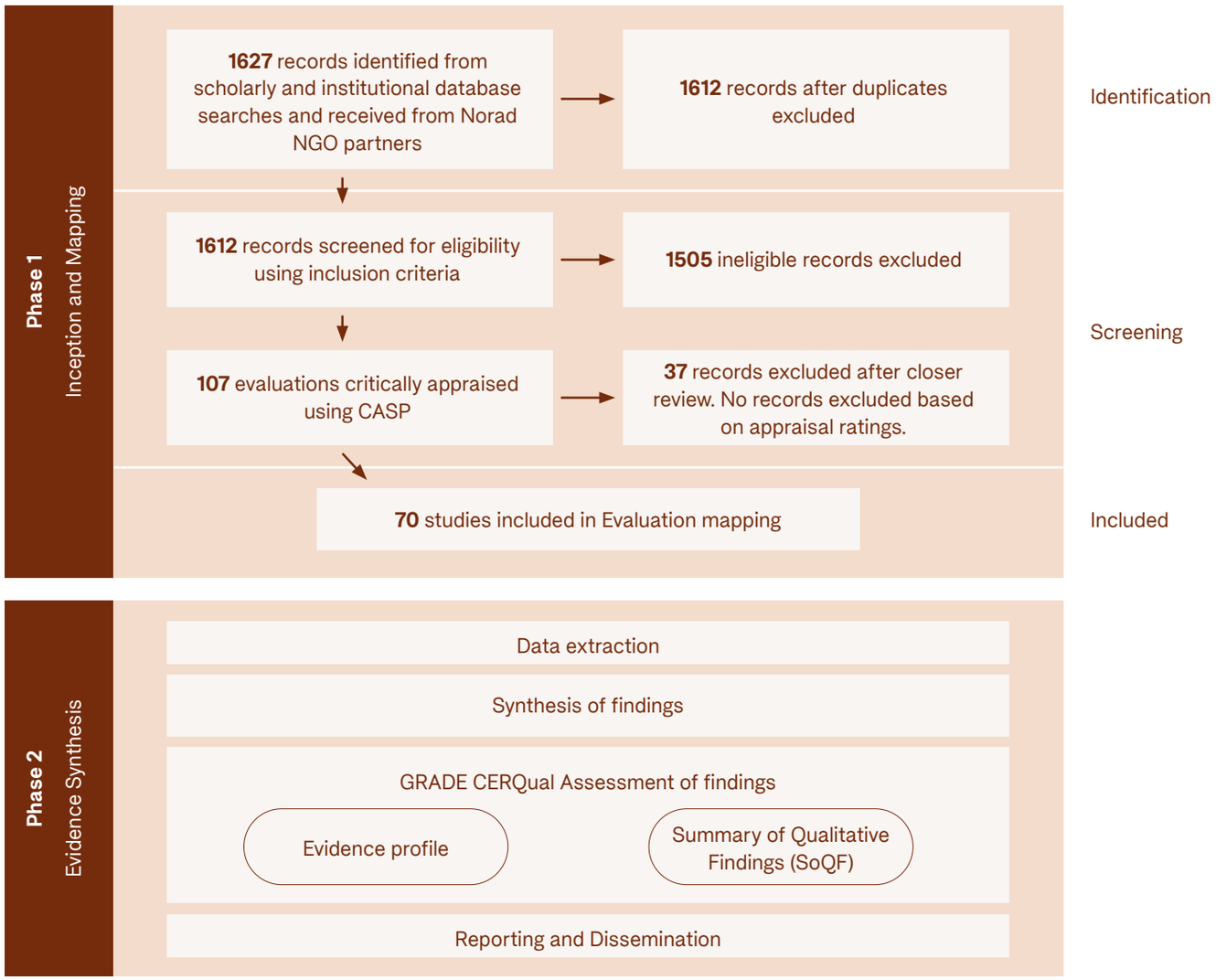
Photo: **Gunnar Zachrisen** | Panorama

Methodology

This review of process evaluations of climate adaptation efforts in food production interventions had two phases: an inception or "mapping" phase and a synthesis phase. This section details the process we followed for both phases of the study. During the mapping phase, we systematically searched databases and collected relevant evaluations; conducted a critical appraisal of the identified evaluations; and mapped these studies against identified criteria of interest. During the synthesis phase, we analyzed and consolidated the existing evidence on the barriers and facilitators to implementation of climate adaptation in food production. The adapted PRISMA flow diagram (Figure 2) illustrates the steps in this evidence synthesis.

FIGURE 2

PRISMA Flow Diagram[2]



2 Adapted from Moher et al. (2009) and Page et al. (2021).

Phase 1: Inception (Mapping)

The inception phase had three main goals: (a) identify relevant process evaluations and examine the extent, range, and nature of this evidence; (b) assess the evaluations for quality, reliability, and value for inclusion in the synthesis; (c) map evaluations based on the proposed criteria (see Task 5).

The following questions guided our database search:

1. What is the existing evidence base on the implementation of climate adaptation in food production interventions undertaken by Norad's food security partners?
2. To what extent are process evaluations of these interventions publicly available and accessible?

The following question guided our critical appraisal of identified evaluations:

3. What is the quality, reliability, and value of process evaluations (qualitative and mixed methods) conducted to assess the implementation success of climate adaption in food production interventions?

The following questions guided the evaluation mapping:

4. What is the extent and nature of the available evidence on the implementation of climate adaptation in food production interventions undertaken by Norad's food security partners (e.g., geographic scope, target group(s), intervention, and evaluation purpose)?
5. Which of Norway's partners is publishing the most process evaluation evidence related to climate adaptation in food production interventions?
6. What types of issues do these evaluations aim to uncover?
7. Who are the participants in the evaluation, and do they include indigenous groups and/or disadvantaged populations?

Here, we describe the methods for mapping the evidence.

Systematic Database Search. We conducted a systematic search in scholarly and practitioner databases to collect process evaluations using qualitative, quantitative, or mixed methods. Searching both scholarly and practitioner databases helped

TABLE 2

Search Databases

Scholarly databases	Databases of Norad's key partners	Databases of other organizations for food security
• EBSCO Host (including Academic Search Premier and GreenFILE databases) • CAB Direct • Web of Science • 3ie	• FAO • WFP • IFAD • The World Bank • The African Development Bank • The Development Fund (Utviklingsfondet) • Nordic Development Fund • Norwegian Church Aid (Kirkens Nødhjelp) • Norwegian People's Aid (Norsk Folkehjelp) • Royal Norwegian Society for Development (Norges Vel) • Care • Digni • Caritas	• EU Knowledge Center • Food Security Cluster • Global Panel on Agriculture and Food Systems for Nutrition • CGIAR • IPCC • United Nations • IGAD • RPCA • DFID (replaced by FCDO) • Feed the Future

identify a comprehensive range of evaluations commissioned by Norad's key partners and in peer-reviewed or gray literature. Additionally, we consulted Norad's key partners to identify a comprehensive evidence base. Table 2 shows the databases we searched, and this section details the database search process.

We used a two-step process to identify relevant studies. First, we identified key reviews and evaluations, or "anchor papers," through a rapid database search. The anchor papers served three purposes: (a) to assess the reliability of search strings by checking that the anchor papers surface during each of the scholarly database searches; (b) to finalize the search strings by checking our key terms against the key terms in these papers; and (c) to identify relevant studies in their references and ensure our searches also return those studies. Anchor papers were selected based on their relevance and citation numbers (high vs. low number of citations). (See references for a list of anchor papers: Aggarwal et al., 2018; Bakhsh et al., 2020; Barrett et al., 2020; Garibaldi et al., 2017; Mwadzingeni et al., 2022).

For the systematic database search, we applied the Problem/Phenomenon of Interest, Intervention, and Evaluation (PIE) framework. The PIE framework is more inclusive of process evaluations and qualitative studies than other frameworks commonly used for evidence synthesis of impact evaluations (e.g., Population, Intervention, Comparison, Outcomes) (PICO).[3] In the context of this study, the phenomenon of interest is a climate-related problem, event, or process targeted through the climate adaptation focus of food production interventions. Intervention differs from the phenomenon of interest in its focus, specifically referring to the components of food production systems. Evaluation refers to the types of research and data collection designs. The PIE framework helped refine the search strings for scholarly databases and key partners' and organizations' databases that allow systematic Boolean search (AND/OR combinations of key terms).

We piloted the proposed search strings and incorporated feedback from the Department for Evaluation in Norad and stakeholders. We used the search strings presented in Appendix C to run Boolean searches in key databases with the following parameters:

- phenomenon of interest, intervention, evaluation, and population key terms are searched in abstracts; organization key terms are searched in full text.
- dates: January 2010–December 2022
- language: English, French
- publication type: Academic journal, book, dissertation, report, working paper

3 See a list of nearly 40 frameworks reviewed by the British Medical Journal: Rapid review of existing question formulation frameworks.

We exported all returned evaluations to Excel. Table 3 presents the results from our database searches. Databases that returned no results are not included in the table below.

TABLE 3

Database search results

Database	# of studies screened against inclusion criteria	# of studies that qualified for critical appraisal/ mapping	# of studies to be included in synthesis
3ie	127	5	2
CABI	3	0	0
EBSCO	294	0	0
EU Knowledge Center	2	1	1
FAO	73	10	7
FCDO	54	0	0
IFAD	49	17	14
Norad	10	0	0
UNEG	348	15	8
Web of Science	525	3	0
WFP	16	8	8
World Bank	39	5	2

Note: Some of the duplicate evaluations were found in more than one database.

As most Norad partner databases are not equipped to conduct Boolean searches, we implemented the following approach:

1. For databases that have 500 or fewer documents, we reviewed titles and abstracts to pull the relevant evaluations.
2. For databases that have 500 or more documents, we applied a basic search approach using combinations of key terms under phenomenon of interest and intervention: for example, ["climate" OR "environment"] AND ["food production"].

The Department for Evaluation in Norad contacted Norway's key food security partners in developing countries and asked them to send evaluations directly to AIR for consideration. Table 4 shows the evaluations shared by Norway's key food security partners. CARE publishes the most evidence related to climate adaptation in food production interventions, but the Development Fund and CARE published an equal number of process evaluations that met our criteria for inclusion.

Screening for Inclusion. In total, the database search and evaluations from Norway's key food security partners in developing countries returned 1,627 results, of which we immediately identified and eliminated 15 duplicates. We reviewed the remaining 1,612 titles and abstracts for relevance based on the inclusion criteria in Table 5. There were 107 studies that passed the first screening process against the inclusion/exclusion criteria and qualified for critical appraisal and mapping.

Critical Appraisal of Evaluations. During the critical appraisal, we eliminated four additional duplicates, leaving 103 papers. We then further eliminated another 33 papers which, on full text review, were found to have not met all the initial inclusion criteria.

We assessed the methodological quality of the 70 remaining studies that met the inclusion criteria using an adapted version of the Critical Appraisal Skills Program (CASP) checklist of questions that is widely used in syntheses of qualitative evaluations. The tool included 29 items to assess studies based on the appropriateness of methodology, study design, recruitment strategy, data collection methods, consideration of researcher's role and ethical issues, data analysis, statement of findings, and value of research. We rated each item on a scale of *High* (mentioned and well explained), *Medium* (mentioned but missing at least one element), *Low* (alluded to but not described in full or explicitly), *N/A*, or *Not Mentioned*. We then tabulated the number of *High* and *Medium* ratings each evaluation received and assigned that number as the overall rating.

TABLE 4

NGO Partner Evaluations

Norad partner	# of studies screened against inclusion criteria	# of studies that qualified for critical appraisal/mapping	# of studies to be included in synthesis
The Development Fund (Utviklingsfondet)	11	11	10
CARE[4]	52	17	10
Digni	2	1	1
Caritas	7	0	0
Norwegian Church Aid	6	4	2
Norwegian People's Aid	1	1	1
Royal Norwegian Society for Development (Norges Vel)	9	6	4

4 We received one study directly from CARE; the 51 other studies were retrieved by systematically searching CARE's database.

Quality and Reliability of Evaluations. Of the 70 evaluations that we applied the adapted CASP tool to, 52 were terminal/endline program evaluations and 18 were midterm evaluations. Most (47) studies used mixed methods, whereas 23 used only qualitative methods.

The methodological ratings for the 70 evaluations ranged from 10 to 28 (i.e., between 10 and 28 combined ratings of a *High* or *Medium* score on individual items). Evaluations that scored between 10 and 15 were rated as overall "medium" quality, while evaluations that scored 16 or higher were rated as overall "high" quality. Most (60) evaluations received a "high" overall quality rating, while a small number (10) received a "medium" overall quality rating.

Overall, evaluations in our study tended to receive lower ratings because they lacked a thorough description of the data analysis process or research ethics considerations. Additionally, many evaluations failed to acknowledge the potential biases of the researcher or research team. Given the focus of the synthesis (to better understand barriers and facilitators), and that cutoff points for exclusion are not well established in qualitative evidence synthesis[5], we decided not to exclude any evaluations based on

5 There is debate over how to determine cutoff points for quality because findings can still be valid even in cases where papers score low on various indicators. See here for further discussion of the challenges with quality ratings and inclusion in evidence syntheses: https://training.cochrane.org/handbook/current/chapter-21#section-21-8

TABLE 5

Inclusion/Exclusion Criteria

Study design	We included primary data collection designs, both qualitative and mixed method studies. We did not include sector plans, program documents, opinion pieces, and reviews.
Study criteria	• **The study must be or include a process evaluation** of a food production intervention that has a component addressing climate adaptation or climate change. As such, along with process evaluations, we also included other types of evaluations when a process evaluation was integrated into the study design. • Interventions must have **clearly defined objectives and strategies for addressing climate and environmental issues**. • Evaluations must be **commissioned by Norway's key food security partners in developing countries** (regardless of where funding comes from). • Evaluations must be **published in English or French and be publicly available**. • The primary focus of the included interventions must be **small-scale producers, farmers, and/or small-scale fishers**. • Evaluations must be published between **2010 and 2022**.
Study objectives	Evaluations must identify barriers to and facilitators for successful implementation. As such, the evaluations included in this study must focus on implementation, program design, institutional capacity, and contextual factors

the CASP rating. The evaluations were consistently of good quality with potential insight into barriers and facilitators, and we are confident they will yield reliable information during the synthesis phase.

Evaluation Mapping. We mapped the 70 studies in a comprehensive Excel spreadsheet according to the thematic categories in Table 6.[6]

TABLE 6

Evaluation Mapping Tool

Thematic category	Definition of thematic category
Key Actors	
Implementer	Name of organization(s) implementing the intervention
Donor(s) supporting intervention	Name of donor(s) supporting the intervention
Evaluator	Name of organization or consultant commissioned for evaluation (**evaluator must be commissioned by Norad partner to be eligible**)
Evaluated intervention	Evaluated intervention
Geographic scope – country	Country (or countries) where the evaluated intervention was implemented
Country context: income level	Low income, lower-middle income, upper-middle income
Country context: level of vulnerability to natural disasters*	Very low, low, medium, high, very high
Country context: conflict-affected	Yes or No
Geographic scope – region	Region where the evaluated intervention was implemented
Intervention year(s)	Enter the intervention year(s)
Target group(s)	Farmers, small-scale producers, fishers, pastoralists/agropastoralists, other
Focus on local and/or disadvantaged group(s)	Indigenous, women, low-income, rural, people with disabilities, youth, climate vulnerable, none
Intervention purpose	Crop production, livestock, fishers/aquaculture
Primary climate focus of intervention	Sustainable production/resilience, conservation agriculture, climate-smart agriculture, sustainable land management, ecosystem preservation

* Classification based on World Risk Report, 2022, WorldRiskReport 2022 - Focus: Digitalization - World | ReliefWeb.

6 Where needed, we will update the evaluation mapping with additional information from the synthesis study

TABLE 6 (CONTINUED)

Evaluation Mapping Tool

Evaluation study	
Evaluation purpose	Stated purpose of the evaluation
Climate adaptation focus	Social, institutional, structural/physical
Research participants	Participants, government officials, implementer and/or project staff, private sector actors
Focus on local and/or disadvantaged group(s)	The extent of data from local and/or disadvantaged groups, including Indigenous people, women, low-income producers, other
Evaluation design	Qualitative, quantitative, mixed methods
Type of evaluation	Midterm evaluation, terminal/endline program evaluation
Language of evaluation document	English, French
Publicly available	Yes, via academic database; Yes, via key partner website; Yes, via other organization website; No
Quality of study	Medium or High
Included in evidence synthesis	Yes or No

Phase 2: Evidence Synthesis

The purpose of the Phase 2 evidence synthesis was to analyze and consolidate evidence from the 70 included studies, documenting the barriers and facilitators to successful implementation. The following questions guided the synthesis study.

1. What works and what does not work for successful implementation (including implementation fidelity) of the climate-adaptive food production interventions evaluated?
2. What are the barriers and facilitators to successful implementation of climate-adaptive food production interventions at regional (e.g., Africa vs. South Asia), systemic, community, and individual levels?

Data Extraction. The first evidence synthesis task was the extraction of additional data from the evaluations that passed the critical appraisal process. We used an NVivo data extraction tool focused on the deductive codes from our conceptual framework.

We imported all PDFs that met the criteria for inclusion and passed the quality appraisal into NVivo. To extract data from the PDFs, we focused on the sections on findings, author's conclusions, and author's recommendations. Although focusing on these sections of the studies, we imported the full-text PDF studies to enable reviewers to understand the context of the full study while coding process indicators and to

allow for identification of the characteristics that may have influenced the implementation of an intervention.

We extracted themes and interpretations made by the author (second-order data) in relation to synthesis questions 1–2 under Phase 2. We originally developed deductive codes for extracting content for the evidence synthesis based on our conceptual framework, and added inductive codes as we began analyzing data to best capture results. Table 7 presents the final codebook.

All members of the research team extracted data from relevant evaluations. Initially, each team member independently extracted data on the same two evaluations to compare and address any inconsistencies in the types of data extracted for each category. Once consensus was achieved, each researcher extracted data from an assigned subset of studies.

Synthesis of Findings. We used a *framework synthesis* approach to synthesize the extracted data in NVivo (World Health Organization, WHO, 2021). In other words, our conceptual framework, outlined earlier, provided a structure to organize the data and to identify deductive or a priori themes for synthesis. At this stage, we analyzed and consolidated evidence on the barriers and facilitators across studies for each of the deductive codes presented in Table 7. The framework synthesis also allowed us to undertake an

TABLE 7

Final Coding List

Thematic Category	Codes	Sub-codes
Design	Program Design	Program description
		Key outcomes
		Theory of Change
		Needs and context assessment, including problem identification
Implementation	Relevance to population	Consideration for local or disadvantaged groups
		Relevance to beneficiaries
		Relevance to policies
		Relevance to other stakeholders
	Communications and awareness	
	Coordination and project management	Cross cutting issues
		Project management with other projects
		Project management within the project
		Project management with Government or CBOs
		Project management with the private sector
	Quality of delivery	Knowledge management and monitoring
		Efficiency
	Quantity of delivery or activities	Information (e.g., flyers, information sharing)
		Skills (e.g., training)
		Resources (e.g., cash, material support)
	Effectiveness	Program uptake
		Outcomes or impact
	Sustainability	Setting up conditions for sustainability
Moderators	Moderators (external and contextual)	Cultural
		Economic
		Environmental
		Governance
		Infrastructure
		Socio political

interpretive, inductive process to identify new themes that emerged from the data but did not align with the deductive themes.

GRADE-CERQual Assessment. We used the GRADE-CERQual (Confidence in the Evidence from Reviews of Qualitative Research) approach to assess how much confidence to place in each review finding. This activity focused on four assessment components (Lewin et al., 2018a, p. 5):

- *methodological limitations*: The extent to which there are concerns about the design or conduct of the primary studies that contributed evidence to an individual review finding
- *coherence*: An assessment of how clear and cogent the fit is between the data from the primary studies and a review finding that synthesizes that data. By "cogent," we mean well supported or compelling
- *adequacy of data*: An overall determination of the degree of richness and quantity of data supporting a review finding (i.e., number of papers supporting the finding AND richness of data in each of these papers)
- *relevance*: The extent to which the body of evidence from the primary studies supporting a review finding is applicable to the context (perspective or population, phenomenon of interest, setting) specified in the review question

We assessed each of the four components for **selected findings from our analysis** and made a judgment about the overall confidence in these findings on a scale of *high*, *moderate*, *low*, and *very low*. Given the large number of findings—some "particularly relevant to a decision-making process" and others not—we decided to apply CERQual to high-level, most policy-relevant findings only to facilitate decision making about the *design* and *implementation* of interventions (Lewin et al., 2018b, p. 14). As a result, for example, we did not use CERQual for findings related to contextual moderators (e.g., socio-political conditions or governance of a country) that we framed as external factors to an intervention which may not directly inform program design and implementation.

Our CERQual assessment included the following processes:

- One review author, who was specifically focused on the CERQual assessment, worked with other review authors to apply CERQual to their individual findings. As such, for each of the international criteria for evaluation categories, at least two review authors (a) determined the findings to which CERQual would be applied; (b) assessed the four components for each of these selected findings; and (c) made a judgment about the overall confidence in the evidence supporting the finding.
- Our judgment of all findings started by default as high confidence and were then downgraded when the reviewers agreed on important concerns about any of the CERQual components. The starting point of high confidence reflected a view that, "each review finding should be seen as a reasonable representation of the phenomenon of interest unless there are factors that would weaken this assumption" (Lewin et al., 2018b, p. 16).
- To assess if there were any concerns regarding the CERQual components:
  - we used the critical appraisal of studies to determine the methodological limitations.
  - we used the quantity of studies and the richness of data coming from these studies to determine the adequacy of data.
  - we held one-on-one and all-team meetings to discuss and determine coherence and relevance of the findings.

Building on Lewin et al. (2018b), we produced two key outputs from the GRADE-CERQual assessment. We developed a **CERQual Evidence Profile** with detailed information about our assessments, including the assessment rates for the four CERQual components, explanation for each of these ratings, overall assessment of confidence in each finding, and explanation for the overall assessment (see Appendix F). We also used the CERQual results to create

succinct, accessible, and informative **Summary of Qualitative Findings** tables that summarize the overall findings and assessments under each DAC category. We present these tables under each category before the narrative discussion of the detailed findings.

Study Limitations

There are three main limitations to the study. First, in compliance with TOR, we only included process evaluations commissioned by Norway's key food security partners in developing countries. Had we included any process evaluations on the topics of interest beyond those of Norad and key partners, the evidence base would have been much larger and potentially more diverse. A second limitation is the potential bias of the research team from AIR; no team members were from the countries in which the evaluated interventions were implemented. Therefore, we may have overlooked certain contextual nuances or inadvertently carried an element of bias in our interpretation of results.

Finally, due to the subjective and interpretative nature of qualitative evidence, researcher bias might have affected some of our findings and CERQual assessment. For example, although we used a coding framework and followed explicit guidelines (e.g., inter-reliability coding) for the analysis and synthesis of evidence, it is likely that these is some variance across team members in terms of what data is coded, how much data is coded, and how these codes are interpreted. This limitation is expected in QES, which we tried to address by regular check-ins to discuss emerging findings, close oversight by the team leader and senior researchers, and triangulation across findings. Similarly, we adhered to the guidelines for CERQual assessment of the selected findings. However, as acknowledged by CERQual developers, the CERQual approach is still under development and some of the assessment criteria are highly subjective, specifically coherence and relevance (Lewin et al., 2018a, 2018b). We tried to address this limitation by holding one-on-one and all-team meetings to discuss and determine to what extent each criterion applied to the selected findings. Still, given the limitations of CERQual assessment—especially methodological limitations of counting in qualitative research (Hannah & Lautsch, 2011)—CERQual findings should be considered carefully, and papers counts should be understood as representative rather than absolute.

3

Mapping Results

In this section, we present the overall results of evaluation mapping, including where the evidence is concentrated geographically and in what sector(s), and the types of climate adaptation approaches that were evaluated.

Findings from Evaluation Mapping

The evidence mapping helps illustrate where the evidence is available and strong, and where the evidence is non-existent or limited (RQs 4–6). Overall, 70 papers represent the existing evidence base of process evaluations on the implementation of climate adaptation in food production interventions commissioned by Norway's key food security partners in developing countries. Of these papers, 51 are publicly available, while we received 19 directly from key food security partners. Six of the papers were available only in French, while the remaining were available in English. The remainder of this section presents some more detailed key findings from the evidence mapping, organized by synthesis questions.

1. *What is the extent and nature of the available evidence on the implementation of climate adaptation in food production interventions undertaken by Norad's food security partners (e.g., geographic scope, target group(s), intervention, and evaluation purpose)?*

Geographic Scope. We reviewed 50 studies on climate-adaptive food production interventions in Sub-Saharan Africa, seven in East Asia and the Pacific, five in Latin America and the Caribbean, four in South Asia, three in the Middle East, and one in Europe and Central Asia. Although most studies (67) focused on one country in these regions, three studies were on the same topic across two or more countries. Twenty-nine of the studies were on conflict-affected countries, and 48 of the studies were in countries characterized as having a very high, high, or medium risk of natural disasters.

Target Groups. Many articles were extremely general in their description of the target group of the intervention. We coded target groups as farmers, fishers, pastoralists/agropastoralists, and producers. Although at least nine studies addressed more than one of these populations, the primary focus of 42 studies was farmers; six studies focused on fishers, 11 focused on pastoralists/agropastoralists, and 11 focused on small-scale producers (as characterized by the study authors).

Sectors. The primary focus of most articles was crop production (55 studies), followed by seven with a fisheries/aquaculture focus, and six with a livestock focus. At least 25 papers had a secondary focus or addressed more than one sector, which—along with terminology differences—likely explains the variation in alignment between the numbers for target groups and sector. Table 8 maps the available evidence by geography and sector.

TABLE 8

Evidence by Geography and Sector

Count of intervention purpose	Crop production	Fisheries/aquaculture	Livestock	Total
East Asia & Pacific	7			7
Europe & Central Asia	1			1
Latin America & Caribbean	3	1	1	5
Middle East & North Africa	2		1	3
South Asia	4			4
Sub-Saharan Africa	38	6	6	50
Total	**55**	**7**	**8**	**70**

2. *What types of issues do these evaluations aim to uncover?*

Climate Focus. Most of the papers focused on sustainable production and resilience (52) or sustainable land management (9). Only four papers focused on conservation agriculture/CSA, and five focused on ecosystem preservation. At least 41 papers had a secondary focus in one or more of these areas.

Adaptation Type. Based on our theory of change, we categorized the studies into evaluations of institutional, social, and structural/physical climate adaptations. While most studies (45) primarily evaluated interventions of social adaptations, such as those targeting smallholder farmer behavior, we also found 17 evaluations of interventions with adaptations at the institutional level, seven focused on structural/physical adaptations, and one that included all three types of adaptation. At least 36 of the articles included a secondary focus on one of the other adaptation types. Table 9 shows the evidence by climate focus and adaptation type.

3. *Who are the participants in the evaluation, and do they include indigenous groups and/or disadvantaged populations?*

Disadvantaged Groups. Of the 70 studies we reviewed, only five studies had no mention of a focus on disadvantaged groups as part of the intervention, likely because the bulk of interventions targeted smallholder farmers who tend to be poor and rural. The 65 studies that did mention a focus on disadvantaged groups targeted women and low-income, rural, and indigenous groups.

TABLE 9

Evidence by Primary Adaptation Type

Climate adaptation focus	Institutional	Social	Structural/ physical	Total
Conservation agriculture/CSA	1	4		5
Ecosystem preservation		7		7
Sustainable land management	1	4	3	8
Sustainable production/resilience	11	33	6	50
Total	**13**	**48**	**9**	**70**

Photo: **Sverre Magnus Petersen** | Norad

Evaluation Participants. Although most of the evaluations we reviewed collected data from the end users of the interventions, seven indicated that they only collected data from implementers, meaning important data on the experiences of participants was missing. Data were also collected from program implementers (67 studies), government officials (46 studies), and other stakeholders, such as private sector actors (5), depending on the type of evaluation.

Though 65 of the interventions focused on disadvantaged groups, less than half (29) of the evaluations of those interventions explicitly included data collection from the disadvantaged groups, and those who did describe data collected from disadvantaged groups primarily mentioned only women. However, many studies also collected data from the primary project participants, who were also from rural or low-income farmers or indigenous groups.[7] Table 10 presents evidence by target group and disadvantaged group.

7 We did not assess the extent to which papers looked at measured poverty levels within low-income groups, meaning there could be wide variation in the interpretation of a group as low-income.

TABLE 10

Evidence by Target Group and Disadvantaged Group

Target group	Total	Women	Indigenous	Rural	Low-income
Farmers	42	34	1	30	29
Fishers/aquaculture producers	6	4	0	2	2
Pastoralists/agropastoralists	11	11	1	7	7
Small-scale producers	11	11	3	7	9
Total	**70**	**60**	**5**	**46**	**47**

Note: Disadvantaged group counts include any mention of that group in all papers. Many papers noted more than one group.

4

Findings from Evidence Synthesis

We present the synthesized findings from the 70 evaluations in the sections that follow. Findings are organized according to four international criterion for evaluation (relevance, efficiency, effectiveness, and sustainability), with barriers and facilitators identified in each section and sub-section.[8] We present a CERQual summary of qualitative findings at the beginning of each main section and elaborate upon them in the respective sub-section.[9] We conclude with a discussion of external and contextual moderators and our assessment of the extent to which local knowledge was considered and built upon in the evaluations synthesized.

Relevance

This section summarizes the evidence on barriers and facilitators to the relevance of climate adaptation in food production interventions. Relevance is assessed in terms of the design of the interventions and the consideration of local context. External and contextual moderators are discussed in a later section.

Several barriers reduced the relevance of climate adaptation interventions. Projects that did not conduct context and needs assessments or consult with target communities during design and implementation, identify differences in the roles and needs of men and women, and require participants to own land were all found to be less relevant to program participants. Interventions that used participatory approaches, diversified women's livelihoods, and improved their access to energy-efficient resources, on the other hand, were important facilitators of relevance. Table 11 below presents the CERQual summary of findings on relevance.

Photo: **Marthe Lid** | Norad

8 Elements of *coherence* are addressed under the sections on relevance and efficiency; elements of impact are addressed under effectiveness, though it is important to note that process evaluations are unable to determine impact.

9 We present a more detailed assessment of each finding in a CERQual Qualitative Evidence Profile in Appendix F. We conducted a CERQual assessment for those in-text findings marked with an asterisk.

TABLE 11

CERQual summary of qualitative findings: RELEVANCE

Finding 1: Project designers and implementers' limited understanding of local context and failure to consult with program participants reduced the relevance of climate adaptation activities, which did not adequately identify or respond to community problems.		
Studies contributing to the review finding	• NCG, 2017 • Andersen, 2019b • Euker and Reichel, 2012 • IFAD, 2022b • FAO, 2022b	• IFAD, 2022c • The Development Fund, 2012 • IFAD, 2017a • FAO, 2021d
CERQual assessment of confidence in the evidence	High confidence	
Explanation of CERQual assessment	9 studies with no or very minor concerns regarding methodological limitations, coherence, adequacy, and relevance.	
Finding 2: The need for farmers and pastoralists/agropastoralists to own land excluded the poorest, including disadvantaged groups such as women and youth.		
Studies contributing to the review finding	• IFAD, 2017a • IFAD, 2012a • IFAD, 2012c • IFAD, 2012b • IFAD, 2020b • IFAD, 2022a • IFAD, 2022b	• FAO, 2017 • The Development Fund, 2015a • The Development Fund, 2015b • Development Alternatives Incorporated, 2020 • World Bank, 2016
CERQual assessment of confidence in the evidence	High confidence	
Explanation of CERQual assessment	12 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	

TABLE 11 (CONTINUED)

CERQual summary of qualitative findings: RELEVANCE

Finding 3: Projects with limited knowledge and context analysis regarding men and women's different roles and needs were less relevant to women.		
Studies contributing to the review finding	• The Development Fund, 2012 • WFP Sri Lanka, 2021 • FAO, 2021a • The Development Fund, 2015a • The Development Fund, 2015b	• IFAD, 2017a • FAO, 2017 • IFAD, 2021 • IFAD, 2020b • IFAD, 2022a
CERQual assessment of confidence in the evidence	High confidence	
Explanation of CERQual assessment	10 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance	
Finding 4: Interventions most relevant to the needs of poor women focused on diversifying their livelihoods and improving their access to energy-efficient resources and practices to increase resilience to climate change.		
Studies contributing to the review finding	• WFP Sri Lanka, 2021 • FAO, 2021d • CARE Ethiopia, 2021 • TSA, 2017	• Andersen, 2019b • Andersen, 2019c • The Development Fund, 2015a • FAO, 2016b
CERQual assessment of confidence in the evidence	Moderate confidence	
Explanation of CERQual assessment	Downgraded to moderate confidence because of moderate concerns about adequacy and relevance.	

Barriers to Relevance

Barriers to the relevance of climate adaptation interventions included the lack of context and needs assessment, limited communication with program participants, the prerequisite of land ownership across many interventions, and unclear targeting approaches.

Finding 1*: ***Project designers and implementers' limited understanding of local context and failure to consult with program participants reduced the relevance of climate adaptation activities, which did not adequately identify or respond to community problems (high confidence).*** Many crop, livestock, and fisheries/aquaculture interventions failed to conduct needs assessments during program design, resulting in interventions that were not contextually relevant (WFP Sri Lanka, 2021; FAO, 2021d; CARE Ethiopia, 2021; TSA, 2017; Andersen, 2019b; Andersen, 2019c, The Development Fund, 2015a, FAO, 2016b). Evaluators of a sustainable production and resilience project in Sri Lanka found through interviews with WFP staff that, "*No thorough needs assessment was conducted at the inception stage in target communities, and no specific assessment to follow up or refine needs was conducted during the course of the project*" (WFP Sri Lanka, 2021, p. 9). As a result, a substantial number of livestock, fishery, and crop production evaluations suggested that project activities and project-built infrastructure were not suitable for local contexts and did not properly address communities' most pressing challenges, making farmers less likely to adopt climate-adaptive practices during the program or over the long term (Development Fund, 2015a). In a sustainable production and ecosystem preservation intervention in the Eastern Caribbean, for example, fishers reported that while the program provided helpful safety at sea training, the project was unable to improve their most immediate safety need: landing site infrastructure (FAO, 2022b). Evaluators of another intervention in Somalia found that community members suggested cement was better suited than a soil berkad for a sustainable production and resilience project, yet project staff failed to listen, and the location of the project's wells made rainwater flow away from program participants instead of toward them (NCG, 2017).

Finding 2*: ***The need for farmers and pastoralists/agropastoralists to own land excluded the poorest, including disadvantaged groups such as women and youth (high confidence).*** Evaluators of a sustainable production and CSA livestock intervention in Uganda stated, "*the implementing partner did not select the poorest of the poor, since before the intervention the beneficiaries had at least some land on which to grow crop*" (FAO, 2017, p. 31). Several other evaluations, including those of a participatory land management intervention in the West bank and Gaza and a smallholder tree crop project in Liberia, noted that this prerequisite for land ownership further disadvantaged women and youth, since they typically do not own land (IFAD, 2017a; IFAD, 2020b). Project staff involved in a land management intervention in Ethiopia and a sustainable land management project in the Gambia also noted that the programs lacked clear targeting strategies to reach the poorest program participants (Development Fund 2015b; IFAD 2022b). Many of the interventions that required participants to own land were funded and implemented by IFAD, suggesting that some of the organization's projects were not designed to reach the most impoverished (though evaluators did not find this to be the case across all IFAD interventions included within the synthesis). Conversely, programs without land ownership requirements successfully reached the rural poor and were relevant to their needs. Poor and food-insecure indigenous and Afro-descendant participants in a sustainable production crop and fisheries/aquaculture intervention in Colombia, for example, said that the project increased their income of and made their livelihoods more resilient to climate change (FAO, 2021b). Evaluators a crop, livestock, and fisheries/aquaculture intervention in Somalia similarly found that the project improved the livelihoods of the poorest and most vulnerable to climatic shocks (Lewin & Abdi, 2022).

Finding 3*: *Projects with limited knowledge and context analysis regarding men's and women's different roles and needs were less relevant to women (high confidence).* Many evaluations found that projects failed to consider men's and women's different roles and needs (The Development Fund, 2012; WFP Sri Lanka, 2021; FAO, 2021a; The Development Fund, 2015a; The Development Fund, 2015b; IFAD, 2017a; FAO, 2017; IFAD, 2021; IFAD, 2020b; IFAD, 2022a). According to an evaluation of a sustainable production and ecosystem preservation intervention in the Eastern Caribbean fisheries sector, no gender assessment was completed, and implementers falsely assumed that women did not own boats, excluding them from a relevant safety at sea training (FAO, 2022b). Evaluators of a market infrastructure crop and livestock intervention in Tanzania said lack of analysis of women's specific constraints (e.g., land access, financial literacy, domestic responsibilities, and dynamics) and roles in planting, harvesting, and postharvest activities limited the initiative's relevance to them (IFAD, 2022a). Effectiveness Finding 25 also discusses women's inclusion in climate adaptation interventions.

Facilitators of Relevance

Factors that contributed to the relevance of climate adaptation interventions included engaging in active dialogue with communities, the use of participatory approaches to reach indigenous or other marginalized populations, and the incorporation of activities that diversified women's livelihoods and reduced their workload.

Finding 4*: *Interventions most relevant to the needs of poor women focused on diversifying livelihoods and improving access to energy-efficient resources and practices to increase resilience to climate change (moderate confidence).* In a crop production intervention in Ethiopia, for example, evaluators said that the distribution of economic fuel-saving stoves was highly relevant to women, whose workloads were lightened, and environments improved (Andersen, 2019b). In a sustainable production intervention in Sri Lanka, evaluators found that postharvest technology centers were developed and staffed with rural poor women to generate climate-resilient livelihoods, which was relevant to their needs (WFP Sri Lanka, 2021).

Finding 5: *Programs designed and implemented using participatory approaches were most relevant to participants, including indigenous populations*. In a crop and livestock intervention in Ecuador, for example, evaluators noted that Spanish–Kichwa translators facilitated ongoing dialogue with the Kichwa community, which led to the implementation of culturally relevant biodiversity conservation methods (FAO, 2018a). Evaluators of a sustainable production and ecosystem preservation intervention in Colombia similarly found that the project used indigenous ancestral knowledge to inform its activities: "*An important contribution the project made was to recuperate ancestral knowledge for use in the riparian forest restoration activities (e.g., use of native seeds) and in the sustainable production plans*" (FAO, 2021b, p. 54). In crop interventions in Ethiopia and Nepal, evaluators concluded that the initiatives were highly relevant to beneficiaries, who engaged in participatory selection breeding and participatory plant breeding – techniques through which farmers lead the selection and development of resilient plant varieties based on farmer needs and local knowledge (Andersen, 2019a; Andersen 2019b). Direct dialogue with communities also helped interventions meet communities' unique climate needs, mitigate conflict over resources, and raise awareness about climate change (FAO, 2022b; WFP Malawi, 2021; CARE Ethiopia, 2019; NCG, 2017). An evaluation of a sustainable fisheries intervention in the Eastern Caribbean indicated that the program's community-based, participatory assessment generated communication materials regarding climate change for local fishers, including information boards posted at landing sites (FAO, 2022b, p. 18). An evaluation of a sustainable production project in Ethiopia found that consultations with participants allowed the project to distribute resources such as goats and drought resistant seed to the community without conflict (CARE Ethiopia, 2019).

Efficiency

This section summarizes the evidence on barriers and facilitators to the efficiency of climate adaptation in food production, including overall efficiency of delivery and of project management coordination with government and community-based organizations (CBOs), with other projects, and with private sector actors.

Several barriers relating to delivery, management, and coordination inhibited the efficiency of the interventions we examined. Funding delays commonly disrupted project timelines, and the lack of monitoring capacity also resulted in the low credibility of intervention results. The failure to consider complementary interventions or potential private sector partners in the project design also inhibited efficient coordination. On the other hand, several aspects of project design facilitated efficiency. For example, clear management structures helped ensure sufficient staffing, resources, and processes for procurement and logistics, while leveraging the project as a knowledge sharing platform for in-country technical expertise led to stronger technical support. Table 12 below presents the CERQual summary of findings on efficiency.

TABLE 12

CERQual Summary of Findings on Efficiency

Finding 6: Barriers to project efficiency often stemmed from delays caused by funders and contracting officers.		
Studies contributing to the review finding	• FAO, 2018a • FAO, 2018b • Peham, 2017 • IFAD, 2017a • IFAD, 2018a • FAO, 2017 • FAO, 2016b	• FAO, 2021d • Andersen, 2019b • Djedjebi, 2016 • WFP Kenya, 2022 • LTS International, 2020 • The Development Fund, 2015a • The Development Fund, 2015b
CERQual assessment of confidence in the evidence	High confidence	
Explanation of CERQual assessment	14 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	

TABLE 12 (CONTINUED)

CERQual Summary of Findings on Efficiency

Finding 8: Evaluations of crop production interventions found that that farmers did not find climate data—which have high potential to help producers—to be easily understood nor accessible		
Studies contributing to the review finding	• Diarra & Monimart, 2012 • DeVries et al., 2019 • Euker & Bolte, 2015	• Longley et al., 2019 • FAO, 2016a
CERQual assessment of confidence in the evidence	Low confidence	
Explanation of CERQual assessment	Downgraded to low confidence because of moderate concerns about coherence and relevance and serious concerns about adequacy.	
Finding 9: Efficient management of procurement, resources, and technical staff enabled projects to focus on the technical aspects of implementation.		
Studies contributing to the review finding	• FAO, 2016b • FAO, 2019 • FAO, 2020 • FAO, 2022a • IFAD, 2017b • IFAD, 2019 • IFAD, 2021	• Peham, 2017 • FAO & WFP, 2019 • Norges Vel, 2019 • WFP Uganda, 2016 • WFP Malawi, 2021 • WFP Office of Evaluation, 2016 • The Development Fund, 2015b
CERQual assessment of confidence in the evidence	High confidence	
Explanation of CERQual assessment	14 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	

TABLE 12 (CONTINUED)

CERQual Summary of Findings on Efficiency

Finding 10: Using monitoring to adapt program implementation contributed to increased usefulness and efficiency.		
Studies contributing to the review finding	• FAO, 2019 • FAO, 2020 • FAO, 2021a • FAO, 2021b • FAO, 2021c • FAO, 2021d • FAO, 2022b • IFAD, 2012c	• IFAD, 2022b • CARE Ethiopia, 2021 • Diarra & Monimart, 2012 • Lewin & Abdi, 2022 • Euker & Reichel, 2012 • The Development Fund, 2015a • The Development Fund, 2019
CERQual assessment of confidence in the evidence	High confidence	
Explanation of CERQual assessment	15 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	
Finding 13: Although the multi-sectoral nature of climate programming necessarily implicates several government and civil society actors, the failure to articulate agency roles or identify a coordinating body led project staff to report inefficient collaboration, delays, and reduced buy-in.		
Studies contributing to the review finding	• IFAD, 2020b • FAO, 2020 • FAO, 2021b • FAO, 2021d • DeVries et al., 2019	• Longley et al., 2019 • World Bank, 2014 • Euker & Bolte, 2015 • WFP Sri Lanka, 2021 • Lewin & Abdi, 2022
CERQual assessment of confidence in the evidence	High confidence	
Explanation of CERQual assessment	10 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	

TABLE 12 (CONTINUED)

CERQual Summary of Findings on Efficiency

Finding 16: In evaluations of crop production, livestock, and fisheries interventions, stakeholders at all levels identified the importance of capitalizing on in-country technical expertise by involving research institutions, producer organizations, and extension workers in planning, implementation, or as project participants.		
Studies contributing to the review finding	• FAO, 2018a • FAO, 2018b • FAO, 2019 • FAO, 2021a • FAO, 2022b • Andersen, 2019c • CARE Ethiopia, 2021	• Euker & Reichel, 2012 • LTS International, 2020 • WFP Sri Lanka, 2021 • WFP Office of Evaluation, 2016 • WFP South Sudan, 2021 • Westengen, 2016
CERQual assessment of confidence in the evidence	High confidence	
Explanation of CERQual assessment	13 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	
Finding 18: Evaluators sometimes concluded that adherence to a shared climate adaptation approach (e.g., CSA, value chain) between multiple projects facilitated coordination between them.		
Studies contributing to the review finding	• FAO & WFP, 2019 • IFAD, 2021 • Longley et al., 2019	• Diarra & Monimart, 2012 • WFP Malawi, 2021
CERQual assessment of confidence in the evidence	Moderate confidence	
Explanation of CERQual assessment	Downgraded to moderate confidence because of moderate concerns about relevance and serious concerns about adequacy.	
Finding 20: Evaluators found that successful private sector partnerships were more likely to emerge when crop production and fisheries interventions worked to strengthen the capacity of producer cooperatives according to a value chain approach.		
Studies contributing to the review finding	• AIR Consult, 2015 • FAO & WFP, 2019 • FAO, 2022b	• Norges Vel, 2019 • IFAD, 2020b
CERQual assessment of confidence in the evidence	Moderate confidence	
Explanation of CERQual assessment	Downgraded to moderate confidence because of moderate concerns about relevance and serious concerns about adequacy.	

Barriers to Efficient Delivery

Beyond common challenges to efficiency such as delays in funding, procurement, and availability of equipment, barriers also included the use of inappropriate approaches to climate adaptation—often stemming from the program's lack of a basic understanding of moderating constraints—and attempting to implement too many activities. More than half of the included evaluations also identified a need for strengthening monitoring capacity, including to understand progress beyond the output level.

Finding 6*: *Barriers to project efficiency often stemmed from delays caused by funders and contracting officers (high confidence).* Evaluations identified that donors' delays in disbursement of funds (FAO, 2018a; Peham, 2017; The Development Fund, 2015b), lack of alignment between implementers and government partners (WFP Sri Lanka, 2021), and general donor implementation inflexibility (FAO, 2017; WFP Kenya, 2022) all contributed to overall program inefficiency. Some evaluations attributed the challenges to "an inadequate diagnostic exercise" (IFAD, 2017a, p. 12), or a lack of planning that could have mitigated the challenges (Andersen, 2019b; FAO, 2016b, 2021d; IFAD, 2017a; LTS International, 2020). The main result of these challenges was a delay in program implementation timeline, which—given the importance of timing for accommodating agricultural seasons in most of these projects—sometimes negatively affected the ability of the program to show impact. One evaluation in Mali noted, "*the disbursement of funds did not follow the pace of agricultural campaigns on several occasions, which slowed down or blocked some seasonal activities*" (FAO, 2018b, p. 19).

Finding 7: *In several studies of multi-sectoral interventions, project staff found that implementation was siloed by sector and that project components lacked integration* (DAI, 2020; Euker & Bolte, 2015; FAO, 2021a; FAO, 2021d; IFAD, 2018b; IFAD, 2022b; WFP Kenya, 2022; WFP Sri Lanka, 2021). In Kenya, evaluators found that an intervention's "*emphasis on food systems … demands a stronger integration and the removal of any remaining work in silos*." They recommended that the intervention consider food safety and quality activities to fully realize a food systems approach (WFP Kenya, 2022, p. 14). In Mozambique, evaluators found that the project activities of the three implementers did not reach the same participants: "The FAO FFS members were often not trained in agricultural marketing through IFAD-PROMER or WFP activities or vice versa were members of farmer associations participants of FFS groups; nor were the women receiving nutrition education selected from other Result Components" (DAI, 2020, p. 13). Most often, implementation silos were attributed to the existence of multiple implementers with responsibility over separate project components, suggesting the importance of integration at the project design stage (Euker & Bolte, 2015; DAI, 2020; FAO, 2021a; IFAD, 2022b; WFP Kenya, 2022; WFP Sri Lanka, 2021). Other causes included the large intervention area making it difficult for implementers to coordinate to layer activities (IFAD, 2022b) and insufficient oversight by the project steering committee (FAO, 2021d).

Finding 8*: *Evaluations of crop production interventions indicated that farmers did not find climate data—which have high potential to help producers (see Finding 37)—to be easily understood nor accessible (low confidence).* In Ethiopia, evaluators found that participant farmers were misinterpreting rainfall probability maps because "*scientific weather forecasts can be difficult to understand*" (DeVries et al., 2019, p. 29). An agricultural intervention in Zambia similarly recommended that climate data should be "*downscaled*" from a technical weather bulletin format "*into messages that are better understood by the farmers in their local settings*" (FAO, 2016a, p. 45). Some projects overcame these barriers by broadcasting forecasts over the radio and in local languages (FAO, 2022a) or by engaging "traditional forecasters" in relaying rainfall predictions (CARE Ethiopia, 2021, p. 19).

Facilitators of Efficient Delivery

Factors that facilitated intervention efficiency aligned with common facilitators to other aspects of program implementation, including working through existing structures, strong partnerships, and ensuring cost-effectiveness. Evaluations also identified that high-quality monitoring activities contributed to increased

project efficiency. Here, we focus on how projects with sufficient resources, technical staff (in terms of knowledge and quantity), and streamlined procurement and logistics were more likely to have efficient project implementation.

Finding 9*: *Efficient management of procurement, resources, and technical staff enabled projects to focus on the technical aspects of implementation (high confidence).* As discussed in the section on efficiency challenges, efficient project administration required much attention, and enabled smooth operations when prioritized (FAO, 2019, 2020; IFAD, 2017, 2019, 2021; Norges Vel, 2019; The Development Fund, 2015b). An evaluation of a conservation agriculture program in Mozambique (Peham, 2017) demonstrated the importance of efficient procurement in the success or failure of a program, *"In some communities a successful vaccination in 2016 was reported with great increases in numbers of chickens. But this success turned into a failure in 2017 when most chickens died again due to the late arrival of vaccines"* (p. 54). Establishing management structures also proved important to ensure continued implementation through challenges such as shocks (WFP Malawi, 2021, WFP Uganda, 2106). An evaluation in Senegal that took place partly during COVID-19 (FAO, 2022a) stated, *"The delegation of procurement procedures to farmers' organizations, technical assistance from the Regional Development Agency and the selection of local service providers made it possible to set up procurement procedures, contract execution and monitoring in a transparent and timely manner"* (p. 47). While the evidence suggested that inputs should be procured locally to the extent possible, several studies noted challenges in working with the global supply chain of seeds and livestock vaccines (FAO, 2016b; FAO & WFP, 2019; Peham, 2017).

Finding 10*: *Using monitoring to adapt program implementation contributed to increased usefulness and efficiency (high confidence).* Only 24 of the studies included in our analysis described strengths of their approach to monitoring. Of these papers, only 15 explicitly stated that they actively fed the results from their monitoring activities back into the project (CARE Ethiopia, 2021; Diarra & Monimart, 2012; Euker & Reichel, 2012; FAO, 2019, 2021b, 2020, 2021d, 2021c, 2022b; IFAD, 2012c; 2022b; Lewin & Abdi, 2022; The Development Fund, 2015a, 2019). Multiple papers mentioned the advantage of using SMART indicators (e.g., Development Fund, 2019; FAO 2020), as well as training and incorporating ongoing monitoring as a specific aspect of the project. An evaluation of climate change adaptation in the fisheries sector in the Eastern Caribbean (FAO, 2022b) said, *"A range of means were used to disseminate these lessons outwards, according to prevailing preferences"* (p. 53). Finally, five papers described how monitoring had been used for uptake of lessons beyond the program, which could facilitate efficiency over the long term (FAO, 2017, 2020, 2021a, 2021b; IFAD, 2021); for example, a program in Ecuador to promote climate-smart livestock management (FAO, 2020) stated, *"Technicians... as well as producers were trained in the use of these tools for decision-making so as to aid in ensuring their use after the project ends. Both tools are in the process of being launched in a mobile application developed by private company Telefónica, which will enable them to be used on a larger scale"* (p. 28).

Finding 11: *As small-scale producers have a range of literacy levels, the use of multiple, reinforcing communication channels improved the likelihood of reaching targeted producers.* Producer groups that include women, ethnic minorities, or indigenous populations often have higher levels of illiteracy (Andersen, 2019c; CARE Ethiopia, 2021; Diarra & Monimart, 2012; Euker & Reichel, 2012; WFP Office of Evaluation, 2016; WFP Uganda, 2016). For instance, an intervention in Malawi noted that, *"Illiteracy rates are higher among women than men, and phone ownership is lower among women ... consequently, the uptake of mobile platforms by women is significantly lower than by men"* (Longley et al., 2019, p. 43). As a result, the use of multiple, diverse dissemination methods and knowledge products proved most effective for reaching all producers. For instance, the Livelihoods Resilience Activity in Ethiopia employed video-enhanced extension training and value chain product cards to enhance uptake (DeVries et al., 2019). Another project in Niger disseminated its training manual in two versions: one in French and another as an illustrated chart that was developed by community members (Diarra & Monimart, 2012).

Barriers to Efficient Coordination and Project Management

This section addresses barriers to project coordination with government and CBOs, other interventions, and private sector actors. The evidence indicated how markets and in-country institutions can pose a barrier to the efficient coordination and management of food production interventions.

Finding 12: ***More than half of evaluations described a need for strengthening monitoring capacity among program and government actors, evidenced by the lack of clarity in how to use the system, low credibility of results, and a lack of focus on process and outcomes, as opposed to outputs.*** An evaluation of a lead farmer extension system (Andersen, 2019c) said, *"Even though relatively clear criteria have been established, there have been uncertainties as to how to apply them in practice"* (p. 32). Six of the papers discussed that when a program's monitoring approach focused on outputs, implementers were unable to understand challenges. An evaluation of a biodiversity management program in South Asia (Development Fund, 2012) stated, *"What is missing is a platform where partners can discuss, raise issues they are facing 'at home', express dilemmas and concerns, ask questions, [or] share methods or results"* (p. 39). Similarly, an evaluation on sustainable land management in Ethiopia (Development Fund, 2015b) described that the monitoring lacked *"narrative reporting... on achievements and challenges in relation to the implementation"* (p. 16). Finally, 10 papers described a lack of integration of data into decision making where monitoring is occurring.

Finding 13*: ***Although the multi-sectoral nature of climate programming necessarily implicates several government and civil society actors, the failure to articulate agency roles or identify a coordinating body led project staff to report inefficient collaboration, delays, and reduced buy-in (high confidence).*** Depending on their objectives, interventions coordinated with government bodies in the areas of agriculture, environment, livelihoods and social protection, gender equity, and nutrition. The multitude of partners led to low buy-in from government interlocutors, poor meeting attendance, difficulty reaching consensus, and project delays. For instance, the evaluation of an intervention in Colombia reported, *"the inability to install the Steering Committee in the first year of the project [was] due to the difficulty in juggling the agendas, priorities and approaches of the 14 government entities composing it"* (FAO, 2021b, p. 29). Compounding this challenge, many governments lacked a multi-sectoral body on climate change to support project coordination. At least three projects aimed to support the establishment of such a body within the partner government (Euker & Bolte, 2015; FAO, 2017; WFP South Sudan, 2021). In the absence of a multi-sectoral working group, the evidence suggested the importance of delineating clear responsibilities for government partners: *"It was apparent in the evaluation interviews with government officials that they considered that the project/FAO should have had a well-defined service function, including clear roles and responsibilities for individual agencies, and for project coordination and implementation by the line agencies"* (FAO, 2021d, p. 31).

Finding 14: ***Project staff and evaluators found that the failure to seek partnerships during project design inhibited coordination with other projects.*** Commenting on the climate adaptation and resilience sector, an evaluation in Malawi concluded, *"There is a plethora of small-scale projects and pilot activities implemented by a wide range of different NGO partners, making both coordination and achieving impact at scale a challenge"* (Longley et al., 2019, p. 34). In failing to consider coordination with other relevant projects, most evaluations in this study also demonstrate the fragmented nature of the climate sector. For instance, evaluators of an intervention in Niger that helped establish an early warning system highlighted that the project failed to consider linkages to Sahel-wide early warning systems ROSELT and AGHRYMET (Diarra & Monimart, 2012).

Finding 15: ***Project staff and implementers in several studies highlighted how the failure of crop production and fisheries interventions to develop market-quality products inhibited private sector collaboration*** (FAO, 2018b; IFAD, 2020b; KPMG International Development Advisory Services, 2022b). In Mozambique, one evaluation noted, *"Suspicion of TiLV [Tilapia Lake Virus disease] infection has damaged CEPAQ's reputation, as a reliable provider of broodstock and fry. CEPAQ has not regained the confidence of the private market"* (KPMG International Development Advisory Services, 2022b, p. 32). In Liberia, the lack of government regulation made the project's targeted product, cocoa, unattractive to global markets (IFAD, 2020b). Lastly, at least three projects encountered constraints related to government regulation of seed suppliers (Cabinet d'Etudes Harvest, 2018; FAO, 2018b; Westengen, 2016), and another evaluation indicated barriers related to governmental regulation of livestock vaccines (FAO, 2016b). The evaluations pointed to the need to strengthen the capacity of existing, government-supported supply chains for controlled inputs like seeds and vaccines.

Facilitators of Efficient Coordination and Project Management

The evaluations also highlighted several strategies for working effectively with government authorities and CBOs, other projects, private sector actors, and communities, including by leveraging the project as a knowledge-sharing platform and by advocating for the importance of climate change adaptation within governments.

Finding 16*: ***In evaluations of crop production, livestock, and fisheries interventions, stakeholders at all levels identified the importance of capitalizing on in-country technical expertise by involving research institutions, producer organizations, and extension workers in planning, implementation, or as project participants (high confidence).*** Many evaluators highlighted how interventions were most effective when equipped with both implementation/project management expertise and technical expertise at all levels (Andersen, 2019b; CARE Ethiopia, 2021; Development Fund, 2015b; Development Fund, 2019; FAO, 2016b; FAO, 2017; FAO, 2018a; FAO & WFP, 2019; IFAD, 2020b; Norges Vel, 2019; WFP Uganda, 2016). For instance, an aquaculture project in Madagascar ensured that all target communities were covered by both a technician and a socio-organizer (Norges Vel, 2019). Further, numerous interventions relied on in-country research institutions for technical input into project planning and implementation (Development Fund, 2015a; FAO, 2017; FAO, 2019; IFAD, 2018a; LTS International, 2020; Norges Vel, 2019). A conservation project in China targeting small-scale producers found, *"The project experts (16) come from seven organizations or institutions … covering ten disciplines, such as wetland ecology, environmental engineering, sociology, and economics …. In this sense, the project has become a learning network and platform for learning"* (FAO, 2019, p. 13). An agricultural intervention in South Sudan meanwhile relied on government extension workers for technical support in responding to contextually relevant challenges like the African Fall Armyworm infestation and postharvest handling of cereals and vegetables (WFP South Sudan, 2021). We present more findings on the importance of local embeddedness in Finding 41.

Finding 17: ***Some evaluators suggested that interventions should include policy advocacy and awareness-raising activities to address a lack of political will to address climate change.*** In talking with project staff, evaluations of interventions across sub-Saharan Africa, South America, and Southeast Asia noted the lack of interest by national (DeVries et al., 2019; Diarra & Monimart, 2012; Euker & Bolte, 2015; FAO, 2021d) and local (Diarra & Monimart, 2012; Euker & Bolte, 2015; FAO, 2020; FAO, 2021b; IFAD, 2021) governments to participate in climate adaptation and planning processes. Two projects successfully overcame the lack of political will by conducting awareness-raising activities with government authorities prior to conducting project activities (Euker & Bolte, 2015; FAO, 2021b). However, other projects cited a lack of staffing and resources within government as responsible for the lack of interest in the project (Diarra & Monimart, 2012; FAO, 2020; IFAD, 2021; DeVries et al., 2019).

Finding 18*: ***Evaluators sometimes concluded that***

adherence to a shared climate adaptation approach (e.g., CSA, value chain) between multiple projects facilitated coordination between them (moderate confidence). In Malawi, a Participatory Integrated Climate Services for Agriculture (PICSA) approach helped build synergies between multiple projects: *"Both GFCS (Phase 1) and IRMP have provided a learning ground for the PISCA methodology, allowing for UNDP to benefit from the PICSA experience, including the utilisation of the same institution... for technical support"* (Longley et al., 2019, p. 19). Another evaluation of an IFAD intervention in Bangladesh noted, "*there were two separate projects planned for the same area: ADB and KfW operated at the level of larger roads and markets, and IFAD at the level of smaller roads and markets ... bringing the two projects together therefore leveraged complementary approaches to infrastructure*" (IFAD, 2021, p. 8).

Finding 19: ***Project implementers and evaluators in a few interventions suggested indicated that having a shared implementer between two projects facilitated coordination between the projects.*** In Mali, we examined one intervention in which WFP supported cowpea production; the emphasis on legume production made it possible for WFP to buy the cowpea under a different project, Purchase for Progress (FAO & WFP, 2019). In Niger, the Adaptation Learning Programme funded training in community-based adaptation that reached participants across at least four other CARE projects (Diarra & Monimart, 2012). In this way, projects implemented by a single organization were more likely to achieve convergence on the same participants across the different projects.

Finding 20*: ***Evaluators found that successful private sector partnerships were more likely to emerge when crop production and fisheries interventions worked to strengthen the capacity of producer cooperatives according to a value chain approach (moderate confidence).*** In Liberia, an agricultural intervention worked to rehabilitate roads, equip cooperatives with vehicles, and arrange a buyer for cocoa produce to strengthen the productivity of cocoa cooperatives. Evaluators concluded, *"the project laid a foundation for the cooperation between cooperatives and LAADCO [a private buyer]"* (IFAD, 2020b, p. 15). In Grenada, another intervention connected fisher organizations with a processing plant, leading to *"substantially higher benefits to the tuna fishers and the national economy, and ... greater inclusion of fishers in the management of this fishery"* (FAO, 2022b, p. 23). On the other hand, an agricultural intervention in Mali discovered that a local cooperative encouraged the use of synthetic pesticides, contradicting the ecosystem-based approach of the intervention. This project's lack of coordination with the cooperative left farmers receiving conflicting messages and harmed yields that year (FAO, 2018b).

Finding 21: ***Implementers in a few interventions attracted private co-financing by positioning the project as beneficial to the private actor*** (AIR Consult, 2015; FAO, 2021b; FAO, 2020). Though many interventions aimed to facilitate private-sector co-financing, only three studies successfully attracted investment from private buyers, producers, and/or cooperatives. These interventions offered an outlet for corporate social responsibility investments and carbon offsetting payments (FAO, 2021b), or they attracted support from large-scale, private producers who wanted their employees to benefit from project trainings (FAO, 2020). They also established co-financing activities as an objective of the project itself. For example, an aquaculture intervention in Madagascar planned from the outset to *"set up a commercial unit to explore the market and incite private investors/other partners to invest in small facilities ... [to support] the transport of the fresh fish to the sales point"* (AIR Consult, 2015, p. 75).

Finding 22: ***Implementing staff and beneficiaries for several evaluations of crop production and livestock interventions indicated that participatory implementation approaches proved useful for mobilizing and engaging producers.*** They did so by working closely with influential producers, producer organizations, and community authorities to strengthen their capacity and buy-in (Development Fund, 2012; The Development Fund, 2015a; FAO, 2021b). An evaluation of a multicountry intervention in South Asia

strategically worked with *"key resource farmers, and farmers – men and women – with a capacity to analyze the situation, and mobilise people"* (Development Fund, 2012, p. 37). In Ethiopia, another intervention established pastoral development committees at the woreda and kebele level, finding that they improved beneficiary engagement and participation in the project: *"[the committees] were actively engaged in the project implementation activities by mobilizing the communities and preparing community action plans"* (Development Fund, 2015a, p. 38).

Photo: **Marthe Lid** | Norad

Effectiveness

This section summarizes the evidence on barriers and facilitators to the effectiveness of climate adaptation in food production. We first present barriers and facilitators to uptake specifically and then discuss broader barriers and facilitators to achieving the intended outcomes of climate adaptation interventions. External and contextual moderators to effectiveness are discussed in a later section.

Several barriers to the uptake of climate adaptations inhibited the effectiveness of these interventions. For example, evaluations identified reluctance on the part of farmers and agropastoralists to apply improved agricultural techniques because of perceived risk, lack of evidence of profitability, and insufficient supplies. Indeed, some of these barriers to uptake are also linked to design weaknesses, including the failure to incentivize uptake of the intervention or the failure to provide necessary inputs to enable participation. Conversely, the "learning by doing" approach in which participants were supported to apply what they learned in demonstration plots or home gardens was perceived to facilitate uptake and support the effectiveness of climate adaptations. Finally, the timing, duration, and scale of climate adaptation interventions also influenced their effectiveness. Table 13 below presents the CERQual summary of findings on effectiveness.

TABLE 13

CERQual Summary of Findings on Effectiveness

Finding 23: Farmers, agropastoralists, and pastoralists were reluctant or unable to apply improved agricultural techniques such as crop rotation, minimal tilling, mulching, and cover crops.		
Studies contributing to the review finding	• FAO, 2016a • FAO, 2016b • LTS Africa, 2018 • Eucker & Reichel, 2012 • NCG, 2017	• FAO, 2021d • IFAD, 2017b • FAO, 2022a • Andersen, 2019b
CERQual assessment of confidence in the evidence	High confidence	
Explanation of CERQual assessment	9 studies with no or minor concerns regarding methodological limitations, coherence, adequacy, and relevance.	
Finding 25: Evaluators of crop production, livestock, and fisheries interventions perceived that climate adaptation interventions failed to fully consider women's roles and rights (for example, to land and livestock ownership), which ultimately precluded their full participation and uptake.		
Studies contributing to the review finding	• IFAD, 2020b • IFAD, 2022b • CARE Ethiopia, 2021 • IFAD, 2021 • DeVries et al, 2019 • FAO, 2022b • WFP Kenya, 2022	• World Bank, 2016 • LTS Africa, 2018 • FAO, 2019 • Longley et al., 2019 • WFP Office of Evaluation, 2016 • The Development Fund, 2012 • The Development Fund, 2015b
CERQual assessment of confidence in the evidence	High confidence	
Explanation of CERQual assessment	14 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	

TABLE 13 (CONTINUED)

CERQual Summary of Findings on Effectiveness

Finding 27: Smallholder farmers' uptake of climate-adaptive crop production approaches was more consistent when positive results were achieved quickly.		
Studies contributing to the review finding	• FAO, 2017 • World Bank, 2014 • WFP Sri Lanka, 2021	• WFP South Sudan, 2021 • The Development Fund, 2012 • The Development Fund, 2015b
CERQual assessment of confidence in the evidence	Moderate confidence	
Explanation of CERQual assessment	Downgraded to moderate confidence because of minor concerns regarding relevance and moderate concerns about adequacy.	
Finding 34: The limited scale and duration of climate adaptation interventions inhibited achievement of project objectives.		
Studies contributing to the review finding	• FAO, 2021d • LTS Africa, 2018 • World Bank, 2014 • Andersen, 2019a	• Andersen, 2019b • Andersen, 2019c • Westengen, 2016 • The Development Fund, 2015b
CERQual assessment of confidence in the evidence	Moderate confidence	
Explanation of CERQual assessment	Downgraded to moderate confidence because of moderate concerns about methodological limitations, adequacy, and relevance.	
Finding 36: Well-coordinated and properly timed complementary activities facilitated achievement of climate adaptation objectives, including increased production.		
Studies contributing to the review finding	• Longley et al., 2019 • WFP Malawi, 2021 • IFAD, 2022a • DAI, 2020	• Andersen, 2019a • Lewin & Abdi, 2022 • WFP Sri Lanka, 2021 • WFP Uganda, 2016
CERQual assessment of confidence in the evidence	High confidence	
Explanation of CERQual assessment	8 studies with minor or moderate methodological limitations. Minor concerns regarding adequacy and relevance.	

Barriers to Uptake

Evaluations highlighted several key barriers to participation and uptake of climate adaptation approaches, including a reluctance to apply new methods, limited evidence of profitability and weak linkages to markets to incentivize participation, and insufficient consideration of women's roles and rights in different contexts.

Finding 23*: *Farmers, agropastoralists, and pastoralists were reluctant or unable to apply improved agricultural techniques such as crop rotation, minimal tilling, mulching, and cover crops (high confidence).* The evaluated interventions largely focused on conservation agriculture or sustainable production and were primarily social adaptations that included training. Smallholders' reluctance to apply improved techniques was due to several factors, including the inaccessibility of necessary supplies (including water [IFAD, 2017b; Eucker & Reichel, 2012; NCG, 2017]), the perception that improved technologies are more labor-intensive (FAO, 2016a; FAO, 2016b; IFAD, 2017b), and the perceived risk of new methods over traditional farming techniques (NCG, 2017). Regarding the inaccessibility of supplies, an evaluation of a conservation agriculture project in Mozambique found, *"...in many cases they were unable to adopt reduced tillage or mulching on their wider fields because of lack of easy access to sufficient mulch"* (LTS Africa, 2018, p. 11). In Senegal, the lack of locally available seeds prevented farmers from adopting improved short-cycle varieties of millet, maize, and rice that were promoted through a project that aimed to mainstream ecosystem-based farming approaches (FAO 2022a). Other evaluations cited reservations related to the labor required: *"... a key disadvantage of CA for women is the increased need for labor-intensive work, including weeding"* (FAO 2016a, p. 41);*"A common reason given by farmers for not adopting row planting for example in their own garden is labor, particularly women who do not have help"* (FAO 2016b, p. 31); and *"The main reason behind the low uptake of rice-related techniques is labour shortage, which compels farmers to apply broadcasting rather than labour-intensive transplanting"* (IFAD 2017b, pg. 25). Lastly, evaluators of a program designed to support agropastoral communities in Somaliland identified that farmers were "risk averse" when it came to changing their approaches to their livelihoods in a drought-prone environment (NCG, 2017, p. 29).

Finding 24: *Farmers and fishers were less likely to adopt climate adaptation measures when linkages to markets were weak and when there was no clear evidence adoption would be profitable* (Westengen, 2016; FAO, 2016a; IFAD, 2020b; DeVries et al., 2019; FAO, 2022b). Put simply, farmers who could not clearly see the financial benefit of participating in climate adaptation projects were less inclined to participate. According to evaluators of a community seed bank initiative in Malawi, some farmers opted out of the project because the seed distributed only covered a quarter of an acre per farmer, which was insubstantial (Westengen, 2016). Similarly, in Zambia, evaluators of a conservation agriculture intervention found that, *"...agroforestry species whose products have a good market would stand a better chance of being taken up by the farmers. For example, pigeon pea seemed less preferred in Kazungula as farmers were uncertain about the market potential"* (FAO, 2016a, p. 44). Lastly, in Liberia, evaluators assessed that, *"The uptake and use of the solar dryers were low, and farmers continued to use traditional methods for drying. Since traders do not grade the cocoa beans, there was little incentive for farmers to improve the quality of beans through improved drying techniques"* (IFAD 2020b, p. 14). Similarly, some evaluations indicated that micro-finance institutions and insurance providers did not view small-scale producers as profitable clients (DeVries et al., 2019; FAO, 2022b). In Ethiopia, one intervention sought to *"persuade the participating MFIs to tailor their products more to [project] households"* but the evaluators found, *"there does not seem to be a strong commitment made yet by at least some of these institutions to view [project] households as viable long-term loan clients"* (Devries et al., 2019, p. 26).

Finding 25*: *Evaluators of crop production, livestock, and fisheries interventions perceived that climate adaptation interventions failed to fully consider women's roles and rights (for example, to land and livestock ownership), which ultimately precluded their full participation and uptake (high confidence).* In Liberia, evaluators of a smallholder tree crop intervention found that, *"...participation in the project depended on owning a cocoa farm, which largely deprived women of full project benefits, since they generally lack control over land in the traditional rural framework"* (IFAD 2020b, p. 30). Similarly, in Egypt, women were unable to fully benefit from WFP interventions because they were not formally recognized as goat owners (despite being de facto owners) and were not allowed to travel with male beneficiaries to participate in a university-based training on beekeeping (WFP Office of Evaluation, 2016). Finally, in Ethiopia, an evaluation of a sustainable land management initiative found that the project had failed to properly identify and consider women's differentiated roles in land and natural resource management (Development Fund, 2015b).

In addition to land and livestock ownership, norms related to women's household responsibilities, decision-making authority, and mobile phone ownership also affected women's ability to benefit from climate adaptation interventions. The heavy burden of domestic chores limited women's participation in climate resilience activities in Mali (FAO, 2019) and the need to obtain permission from their husbands prior to taking out loans from the rural savings and lending group restricted women's access to market-led smallholder development services in Mozambique (World Bank, 2016). Lastly, women in Malawi participated less in a mobile platform for climate services because they lacked regular access to mobile phones (Longley et al., 2019).

Finding 26: *Evaluators of biodiversity and seed bank-related interventions cited beneficiary confusion, mismanagement of seed banks, and beneficiary reluctance to try new seeds as factors preventing uptake of climate-adaptive approaches* (The Development Fund, 2012; Westengen, 2016; WFP Sri Lanka, 2021; Andersen, 2019a; Andersen, 2019b). In Sri Lanka, for example, evaluators found that, *"there was a lack of understanding of what community seed banks do and what their objectives are"* (WFP Sri Lanka 2021, p. 13). Similarly, in South Asia, seed banks were improperly managed, lacked a clear methodology for seed distribution and recordkeeping, and failed to distinguish between local and improved varieties (Development Fund, 2012). Low community involvement in the management of seed banks and frustration over the volume and diversity of seeds were also perceived as barriers to uptake (Westengen, 2016; Anderson, 2019a). Even Ethiopia, which has a long history of successful community seed banks, confusion over their set-up and profitability led to farmers selling excessive amounts of seed stock and weakening the performance of the banks (Andersen, 2019b).

Facilitators of Uptake

Evaluations identified numerous factors that contributed to intervention uptake, including incorporation of the "learn by doing" approach, working closely with existing social structures, and engaging with full households rather than individuals. Not surprisingly, evaluations found there was more consistent uptake of climate adaptations that showed positive results quickly. A smaller number of evaluations found that female project staff facilitate female engagement and uptake of project activities, and that targeting training helps participants overcome initial doubts about new irrigation schemes.

Finding 27*: *Smallholder farmers' uptake of climate-adaptive crop production approaches was more consistent when positive results were achieved quickly (moderate confidence).* In Brazil, for example, evaluators of an integrated ecosystem management project found that, *"There was particular interest in techniques such as rotational grazing and the protection of springs that had yielded tangible benefits to farmers in a relatively short period"* (World Bank, 2014, p. 32). In Sri Lanka, farmers shared during focus group discussions that they quickly realized good crop yields using sprinklers which motivated them to continue applying micro-irrigation and other water-saving techniques (WFP Sri Lanka, 2021). Evaluations of climate adaptations in Uganda (FAO, 2017), South Asia (The Development Fund, 2012) and Ethiopia (The Development Fund, 2015b) found similar results

with farmers being more likely to adopt improved approaches that showed positive results quickly. Conversely, activities that were perceived to take too long to produce positive results showed lower uptake levels. In South Sudan, a tree planting initiative *"... suffered due to the widespread perception within the community that trees were not important and took too long to provide an economic return"* (WFP South Sudan, 2021, p. 20).

Finding 28: ***Evaluators of crop production interventions identified the "learning by doing" approach as a facilitator of uptake for climate-adaptive farming approaches*** (The Development Fund, 2012; The Development Fund, 2015a; FAO, 2017; FAO, 2019; LTS Africa, 2018). In South Asia, an evaluation of a community-based biodiversity management project found that the ability to try out new organic farming practices in home gardens promoted uptake of climate-adaptive techniques (The Development Fund, 2012). Similarly, in Ethiopia, beneficiaries who had access to demonstration plots were more likely to adopt practices like row planting, crop diversification, and use of compost and manure (The Development Fund, 2015a). In Uganda, an evaluation of a project focused on agricultural adaptation to climate change using farmer field schools (FFSs) showed that, *"The rate of knowledge retention from trainings done in FFS was very high, largely because of the practical hands-on approach applied"* (FAO, 2017, p. 27). Elsewhere evaluators also noted beneficiaries' appreciation for the practical demonstrations associated with the FFS approach (LTS Africa, 2018) as well as other approaches that prioritized direct application of adaptive techniques and co-management of interventions (FAO, 2019).

Finding 29: ***For crop production interventions focused on sustainable production and conservation agriculture, engaging full families (not just individuals) facilitated greater beneficiary participation*** (DeVries et al., 2019; FAO, 2016a). In Zambia, for example, evaluators of the Conservation Agriculture Scaling Up (CASU) project found that lead farmers spoke with *"... the whole family, including children, and ensure that everyone understands the message and can explain their progress in the absence of the LF. The whole household approach is an important element of CASU"* (FAO, 2016a, p. 43). Similarly, in Ethiopia, evaluators of a resilience activity perceived more behavior change among beneficiaries who participated together as a household: *"Couples who attend together have higher enjoyment, view the sessions as more relevant and meaningful in their lives, and describe more behavioral change"* (DeVries et al., 2019, p. 19).

Finding 30: ***Working through existing social structures encouraged beneficiary uptake of climate adaptation interventions*** (CARE Ethiopia, 2021; FAO, 2017; Lewin & Abdi, 2022; WFP Malawi, 2021). Traditional social structures were found to be heavily involved in natural resource and water management, and therefore engaging them from the outset was essential to facilitate community engagement and ownership (CARE Ethiopia, 2021; Lewin & Abdi, 2022; FAO, 2017; WFP Malawi, 2021). In Somalia, the evaluation of a community resilience program found that working through existing structures such as water management committees and village development committees was effective because these groups have "broad public legitimacy" within targeted communities (Lewin & Abdi, 2022, p. 11). Interventions that involved other committees such as rangeland management committees or village natural resource management committees were also perceived to support participation in climate adaptation approaches (WFP Malawi, 2021).

Finding 31: ***Climate adaptation interventions with female staff supported female engagement in project activities.*** (Anderson, 2019c; The Development Fund, 2012). For example, evaluators assessed that female farmers in Malawi preferred to work with female lead farmers on climate-adaptive approaches: *"Women FFs also tend to feel that women Lead Farmers are more attentive to their situations and challenges, and that it is easier to ask questions"* (Anderson, 2019c, p. 35). In

South Asia, evaluators of a biodiversity management program found that having enough female staff was necessary to support female beneficiary participation (The Development Fund, 2012).

Finding 32: ***Evaluators of irrigation interventions found that targeted training was helpful in overcoming initial skepticism about new climate-smart irrigation schemes*** (Arslan et al., 2018; Euker & Bolte, 2015; FAO, 2017). In Timor Leste, implementers of the Maka'as project reported that, "awareness raising" and "mobilization of local residents to participate in the activities" were critical to ensure beneficiary buy-in prior to changing the existing irrigation infrastructure (Euker & Bolte, 2015, p. 18). Evaluators of an improved irrigation system in Uganda had similar findings about beneficiary farmers overcoming skepticism (FAO, 2017), and finally evaluators of the Irrigated Rice Production Enhancement Project (IRPEP) in the Philippines wrote, *"The doubts over the effectiveness of decentralised irrigation system management seem to have been addressed by the IA capacity building and other activities of IRPEP"* (Arslan et al. 2018, p. 32).

Other Barriers to Effectiveness

Apart from uptake, specifically, evaluations of climate adaptation identified other factors that inhibited the successful achievement of results, including the limited scale and duration of the interventions and the lack of agricultural inputs and access to financing.

Finding 33: ***Several evaluations maintained that agricultural production had not increased following adoption of climate adaptation approaches because of limited agricultural inputs and access to finance*** (FAO, 2022a; IFAD, 2018a; IFAD, 2021; IFAD, 2022a; WFP Sri Lanka, 2021). Regarding access to finance, evaluators of the Coastal Climate-Resilient Infrastructure Project in Bangladesh found, *"The lack of impact on productivity was partly due to there being no increase in the volume of agricultural inputs used, with signs that lack of access to capital was a reason"* (IFAD, 2021, p. 22) and evaluators of an irrigation program in Sri Lanka argued, *"...solutions such as polytunnels represent high initial investments which are not within the reach of rainfed smallholders"* (WFP Sri Lanka, 2021, p. 18). Similarly, in Senegal, evaluators concluded that poultry farmers lacked the resources to invest in climate-friendly village poultry houses, equipment, and feed (FAO, 2022a). Elsewhere, smallholder farmers faced challenges accessing the agricultural inputs needed to increase production using climate-adaptive approaches (IFAD, 2018a; IFAD, 2022a)

Finding 34*: ***The limited scale and duration of climate adaptation interventions inhibited achievement of project objectives (moderate confidence).*** Enhanced production from climate-smart agriculture approaches takes time to achieve, and project durations were often not long enough to witness that achievement: *"Achievements have been limited in climate-smart agriculture approaches to enhance crop yields and food security as this requires a fundamental change of mindset, which is challenging to achieve in such a short time period"* (FAO, 2021d, p. 45). Reversing land degradation and reducing erosion also takes considerable time, which is why the Sustainable Integrated Ecosystem Management project in Brazil failed to meet its objectives during the project period (World Bank, 2014). Further, regarding the scale of climate adaptation approaches, evaluations found that activities were not implemented or adopted at sufficient scale to bring about meaningful change (Development Fund, 2015b; Andersen, 2019a; Andersen, 2019b; Westengen, 2016; Andersen, 2019c; LTS Africa, 2018). For example, evaluators of a sustainable land management and livelihoods program in Ethiopia stated that crop and livestock interventions did not achieve their objectives *"... mainly due to the limited scale of these interventions (livestock, sheep credits, bee keeping), [and] the long duration required to yield/generate the economic and other benefits"* (Development Fund, 2015b, p. 20).

Finding 35: ***The conservation agriculture approach involving "minimal soil disturbance" led to more weed growth than traditional ploughing methods*** (FAO, 2016a). For example, the evaluation of CASU in Zambia highlighted that farmers who had adopted conservation agriculture approaches struggled to control weeds on their plots, which ultimately threatened production (FAO, 2016a).

Other Facilitators of Effectiveness

Factors such as well-functioning management committees (water committees, rangeland management committees), access to agroclimatic information, and properly timed and coordinated complementary activities were shown to facilitate effectiveness.

Finding 36*: *Well-coordinated and properly timed complementary activities facilitated achievement of climate adaptation objectives, including increased production (high confidence).* Many climate adaptation efforts are multipronged and multisectoral, which accentuates the need for careful coordination and timing. The evaluation of an integrated risk management and climate services program in Malawi illustrated the positive results achieved when activities are sequenced and timed properly: *"The combination of learning and money (available at the right time) gives farmers the capacity to plan ahead in relation to seasonal forecasts and make the informed choices needed to achieve improved production and increased diversification in the face of climate change"* (Longley et al. 2019, p. 37). Other evaluations highlighted the success of properly timing training to coincide with provision of agricultural inputs (IFAD, 2022a; Lewin & Abdi, 2022; WFP Uganda, 2016), timing e-vouchers to coincide with extension services (DAI, 2020) and timing micro-credit schemes with conservation activities (Andersen, 2019a). Conversely, evaluators of the Food Assistance for Assets program in Malawi identified the "mismatch" in the timing of payments with the agricultural calendar as a barrier to achieving intended results (WFP Malawi, 2021) while evaluators of a program to address climate change in Sri Lanka found that poor coordination and linkages between program components impeded results (WFP Sri Lanka, 2021).

Finding 37: *Access to readily understandable agroclimatic information allowed farmers to plan and adapt their agricultural practices to maximize production* (CARE Ethiopia, 2019; FAO, 2022a; Longley et al., 2019). In Ethiopia, a project focused on resilient livelihoods successfully linked traditional forecasters with agroclimatic information and disseminated it to farmers through local channels and kebele-level early warning systems (CARE Ethiopia, 2019). The evaluation of a climate-resilient rural livelihoods project in Senegal found that, *"...the agroclimatic information received has enabled [farmers] to make informed decisions on the choice of crops and varieties, sowing dates, times for applying fertilisers and phytosanitary products"* (FAO, 2022a, p. 21). Farmers in Malawi reported that information about the weather and seasonal forecasts—coupled with knowledge of CSA—allowed them to make informed agricultural decisions (Longley et al., 2019). The importance of agroclimatic data being accessible and easily understood is discussed under efficiency Finding 8.

Sustainability

This section summarizes the evidence on barriers and facilitators to the sustainability of climate adaptation methods supporting food production. Table 14 below presents the CERQual summary of findings on sustainability.

Overall, evaluations found a lack of embedded plans for transitioning programs away from assistance, which would ideally include an overall exit strategy with technical backstopping, funding, government coordination, and scale. In addition, sustainability was closely related to ensuring that program identification, design, and implementation account for farmer needs and embed them into implementation from the beginning to ensure relevance.

TABLE 14

CERQual Summary of Findings on Sustainability

Finding 38: Evaluations across target groups and intervention types found that failing to build a mechanism to continue funding activities beyond the project period was a key barrier to sustainability.		
Studies contributing to the review finding	• NCG, 2017 • Peham, 2017 • FAO, 2016b • Andersen, 2019b • Andersen, 2019c • IFAD, 2018a • IFAD, 2018b • FAO, 2021a • FAO, 2021b • FAO, 2021c • FAO, 2022a • LTS Africa, 2018 • LTS International, 2020	• KPMG International Development Advisory Services, 2022a • World Bank, 2016 • IFAD, 2022b • WFP Kenya, 2022 • Norges Vel, 2019 • CARE Ethiopia, 2021 • FAO, 2017 • Westengen, 2016 • The Development Fund, 2015a • The Development Fund, 2015b • WFP Office of Evaluation, 2016
CERQual assessment of confidence in the evidence	High confidence	
Explanation of CERQual assessment	24 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	

TABLE 14 (CONTINUED)

CERQual Summary of Findings on Sustainability

Finding 39: Evaluations found that programs were unsustainable when participants perceived that activities were not profitable, useful, or a priority for their business.		
Studies contributing to the review finding	• Arslan et al., 2018 • Euker & Bolte, 2015 • WFP Kenya, 2022 • FAO, 2018a • IFAD, 2017a	• WFP Sri Lanka, 2021 • FAO, 2017 • The Development Fund, 2015a • FAO, 2021d • IFAD, 2020b
CERQual assessment of confidence in the evidence	High confidence	
Explanation of CERQual assessment	10 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	
Finding 42: Building structures to increase financial viability, including credit options, private partnerships, or other ongoing funding increased the likelihood of sustainability.		
Studies contributing to the review finding	• Norges Vel, 2019 • NCG, 2017 • IFAD, 2012c • FAO, 2017 • FAO, 2019 • FAO, 2020 • FAO, 2021b • FAO, 2021c • FAO, 2021d	• FAO & WFP, 2019 • IFAD, 2022a • Lekhoaba, 2019 • LTS Africa, 2018 • IFAD, 2022b • IFAD, 2012b • Westengen, 2016 • The Development
CERQual assessment of confidence in the evidence	High confidence	
Explanation of CERQual assessment	17 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	

Barriers to Sustainability

Barriers to long-term sustainability centered on funding considerations, including a lack of ongoing funding for costly inputs for farmers and lack of initial consideration for how a program can contribute to farmers' income. Importantly, projects also lacked attention to the practical implications of the work for participant incomes, a primary incentive for participation. Some programs also failed to plan for transitioning to government or another entity, continued technical expertise, and scaling.

Finding 38*: ***Failing to build a mechanism to continue funding activities beyond the project period was a key barrier to sustainability (high confidence)***. Many evaluations indicated that programs assumed continued donor funding for basic operations (e.g., Norges Vel, 2019; Westengen, 2016; WFP Kenya, 2022). In some cases, governments failed to even meet expectations for cofinancing during the project period (e.g., FAO, 2021b; Norges Vel, 2019) and did not show efforts to incorporate ongoing project maintenance costs into their budgets (e.g., CARE Ethiopia, 2019; Development Fund, 2015a, 2015b; LTS Africa, 2018), making the transition away from donor funding even more difficult. Although some programs did not require ongoing funding for the program, sustainability of some activities required inputs that proved too costly for farmers (Norges Vel 2019; WFP Kenya, 2022). An evaluation of a seed bank program in Malawi explained, *"The classical challenge for projects of this sort is to become part of a lasting institutional framework – this could be the public extension system, a local university program or as a cooperative"* (Westengen, 2016, p. 18). Finally, generally low budgets also contributed to anticipated challenges with continuation (Ethiopia, 2021; FAO, 2017). We discuss how building in a funding mechanism served as a facilitator to sustainability in the next section.

Finding 39*: ***Programs were unsustainable when participants perceived that activities were not profitable, useful, or a priority for their business (high confidence)***. This finding points to poor planning and problem assessment in program design. Multiple papers indicated that farmers had no interest in continuing program activities, primarily when they did not lead to profit (Arslan et al., 2018; Euker & Bolte, 2015; Development Fund, 2015a; FAO, 2018a, 2021d). For example, Euker & Bolte (2015) wrote, "There is little sign of sustainability, as group members show no interest in continuing with nursery activities unless being paid (or able to make an income by selling seedlings) to do so" (p. 28). In some cases, participants perceived the activities promoted by some programs as less useful than other income-generating activities (IFAD, 2017a; WFP Sri Lanka, 2021) or approaches to climate risk mitigation, including negative coping strategies (WFP Kenya, 2022); for example, an evaluation of a program that established FFS networks in Uganda stated, *"The recently established FFS networks are still fragile structures … many farmers explained that they did not find the networks to be very useful, and there was limited incentive to participate"* (FAO, 2017, p. 39). Many programs failed to adequately consider how practicalities might hinder implementation, making participants more likely to abandon practices (FAO, 2021d; IFAD, 2020b). For example, an evaluation of a program in Cambodia that aimed to increase the adaptive capacity of farmers through increasing knowledge of CSA techniques found that, *"Adoption of the CSA techniques demonstrated by the FFSs is only sustainable based on three main factors: i) business plan and capital for the group; ii) increased income from new cropping system; and iii) reduce labour requirements"* (FAO, 2021d, p. 35). The importance of demonstrating profitability, or at the very least financial maintenance viability, is also discussed under Effectiveness Finding 24.

Finding 40: ***Broadly, many projects lacked explicit end of project transition plans, including limited coordination with partners and participants and continued technical knowledge among staff.*** Many projects had not established how to hand over operations to government and project partners, and in some cases, projects lacked plans as to how to graduate participants from assistance (WFP Kenya, 2022). Evaluations described a lack of planning for continuing to build and maintain knowledge from the project (Development Fund, 2015a); for example, the FAO (2018) evaluation of a project on conservation and sustainable use of biodiversity, forests, soil, and

water in Ecuador found, *"Mentoring is needed in the preparation of the design and implementation of a sustainability and institutional anchoring strategy, in addition to communicating and disclosing its importance in ensuring biodiversity conservation and sustainable use in the long run"* (FAO, 2018, p. 54). Evaluations attributed some of the challenges with transitioning to failing to work through established community structures (e.g., IFAD, 2017a; LTS Africa, 2018). We discuss this as a facilitator of sustainability in the following section.

Facilitators of Sustainability

Assuming project activities included capacitation of skills and knowledge about climate-adaptive approaches to food production, the likelihood of sustainability of these practices was higher when projects embedded project activities in local structures and when projects created financial structures to encourage ongoing participation, in the form of credit facilities and cooperatives, with continued income generation as the central tenant.

Finding 41: Embedding program activities in local structures—including incorporating approaches into government policy and planning—increased the likelihood of sustainability. We discuss the importance of embedding programming in existing local committees, partnerships, activities, businesses, or other structures as part of Finding 8 in the section on effectiveness. In addition to these advantages for sustainability, evaluations also pointed to the importance of explicitly incorporating activities into district-level policy and planning (e.g., CARE Ethiopia, 2019; The Development Fund, 2015b; TSA, 2017; WFP Malawi, 2021) and ensuring that activities account for associated social and institutional change. In the West Bank and Gaza, an evaluation of a sustainable production and resilience project noted that the program's theory of change *"lacked the appropriate balance between the physical works … that are necessary to improve productivity and interventions to strengthen the capacity of community structures and institutions to plan and implement inclusive livelihood options"* (IFAD, 2017a, p. 11). An evaluation of a sustainable production and resilience livestock initiative in Uganda also found *"lack of attention to how social and institutional change will be generated and sustained,"* particularly in the program's theory of change (FAO, 2016b, p. 26).

Finding 42*: *Building structures to increase financial viability, including credit options, private partnerships, or other ongoing funding increased the likelihood of sustainability (high confidence).* As much as financial viability was a barrier to sustainability in some projects, it was also a key facilitator to sustainability for others (Andersen, 2019b; FAO, 2019; IFAD, 2012b, 2012c; LTS Africa, 2018; Lekhoaba, 2019; NCG, 2017). In addition, direct involvement of the private sector (FAO, 2017) and establishment of cooperatives (Development Fund, 2015a; Westengen, 2016) proved to be promising approaches to financial sustainability. Multiple papers also discussed how viable access to credit—such as VSLAs or low interest rate loans—were likely to enable low-income producers to continue activities (FAO, 2020; FAO, 2021c; FAO & WFP, 2019; IFAD, 2012b; IFAD, 2022a; Norges Vel, 2019); for example, Norges Vel (2019) explained, *"The "revolving input credit" in place remains more accessible for producers [...] This system is less expensive for farmers (8% of the gross turnover on sale of production) [and] more adapted to the producers' situation, since the credit repayment after the production sale contributes to finance TDE operating costs"* (p. 66) Many of these evaluations also identified the advantages of encouraging the funding mechanisms to become self-sustaining at the community level (FAO, 2021d; IFAD, 2022b;). An FAO (2020) evaluation of climate-smart livestock management in Ecuador described that with loan schemes managed directly by women producers, "In 61 percent of the cases reported, the credit transactions sought to ensure the sustainability of the CSL practices they had adopted" (p. 23).

Moderators

We define moderators as external and contextual factors that are independent from the interventions, but that may influence their effectiveness and implementation fidelity. We did not apply CERQual to our synthesis of moderators (e.g., sociopolitical or environmental factors) because they are external factors, which do not necessarily inform program design and implementation.

Infrastructure and Environmental Factors

Numerous evaluations found that **severe weather, limited water infrastructure, poor roads, and the general inaccessibility of project sites moderated projects' effectiveness.** Drought was the most frequently cited weather event, but flooding, locusts, cyclones, and hurricanes were also mentioned across studies. Droughts negatively affected agricultural yields and changed program participant behaviors. In Somalia, for example, the evaluation of a community resilience project found that, *"... the drought caused beneficiary populations to disperse in search of pasture/ water and employment and this would have dissipated the impact and effectiveness of the project activities that required collective input, planning and follow-up"* (Lewin & Abdi, 2022, p. 39). Elsewhere in Zambia, evaluators of a conservation agriculture program found that drought caused farmers to abandon conservation approaches in favor of traditional methods (FAO,

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2016a). These findings are somewhat ironic, given that climate-adaptive approaches—in theory—should account for weather-related shocks and include appropriate mitigation measures.

Limited water infrastructure (including irrigation, water supply, and water governance) also impeded the effectiveness of climate-adaptive crop production interventions. Poor water infrastructure and limited supply meant that some farmers only grew crops during the rainy season (IFAD, 2017b) or that excessive time was spent fetching water, which limited participation in project activities (Peham, 2017). An evaluation of a sustainable food systems project in Kenya found that, *"... increased investment in irrigation and water-harvesting infrastructure is needed to allow smallholder farmers to access sufficient water to increase their production"* (WFP Kenya, 2022, p. 17). Similarly, the evaluation of the Food Assistance for Assets project in Malawi found that tree planting and soil conservation activities suffered from insufficient access to water (WFP Malawi, 2021).

Lastly, participants perceived that the poor quality of roads and general inaccessibility of project sites hindered the effectiveness of some climate adaptation interventions, especially those that relied on linkages to markets (Euker & Reichel, 2012; IFAD, 2017b).

Sociopolitical and Governance-Related Factors

Unsurprisingly, **policy environments that were favorable to climate adaptation and more receptive to climate action promoted the implementation of climate-adaptive interventions.** In Brazil, for example, evaluators of a sustainable integrated ecosystem management project stated, *"The policy environment is also more conducive to promoting sustainable land management practices than it was at the project's start. In recent years Brazil has stepped up efforts at enforcement of environmental legislation"* (World Bank, 2014, p. 32). Conversely, changes in leadership, changes to key policies such as land tenure rights (IFAD 2012a; IFAD 2020b), and changes in regulatory policies negatively influenced several climate adaptation interventions. One specific example of a policy change that directly affected a program comes from Malawi, where a new seed policy banned the sale of uncertified seeds, significantly hampering the operations of a newly established community seed bank (Westengen, 2016). Two other seed-related projects (Cabinet d'Etudes Harvest, 2018; FAO, 2018b) encountered challenges with government regulation of seeds and seed suppliers, and three livestock interventions faced challenges with government regulation of livestock vaccinations (Development Alternatives Incorporated, 2020; FAO, 2016b; IFAD, 2017b).

Quite a few of the more recent evaluations cited restrictive policies associated with COVID-19, business closures, and diverted resources during the pandemic as moderators to program efficiency and effectiveness. In some cases, COVID-related restrictions delayed activities (FAO, 2021a) and in others, they required a complete change of approach: *"Planned hands-on workshops were however affected by COVID-19 restrictions"* (FAO, 2022b, p. 20).

Evaluations cited political turmoil and insecurity (such as the Easter Sunday attacks in Sri Lanka and the violence and insecurity plaguing Niger) as inhibiting project implementation and effectiveness. In some instances, political turmoil delayed implementation (Andersen, 2019b) and in others it prevented project activities from being implemented and led to production losses (FAO & WFP, 2019).

Cultural Factors

The two main cultural factors that moderated the effectiveness of climate adaptations were the mobile and migratory nature of program participant populations and pervasive gender norms that limited women's participation in activities. Highly mobile populations were difficult to fully engage in climate adaptation interventions and difficult for implementers to follow up with (Development Fund, 2015a; DeVries et al., 2019). Consideration of women's rights and roles in society is discussed under effectiveness (see Finding 3), but it is also worth

noting that numerous studies specifically identified gender norms as limiting factors for interventions: *"... conservative sociocultural values and norms and family-related responsibilities were a barrier to some women's participation in [labor contracting societies] and markets"* (IFAD, 2021, p. 6).

Economic Factors

Inflation and changes in prices for key inputs such as livestock and seeds were the primary economic factors that tempered the effectiveness of climate adaptation interventions. Evaluations also cited poverty and limited access to capital as moderating factors; the extent to which climate adaptations considered these elements is discussed in the Effectiveness section under Finding 11.

Inclusion of Local and/or Marginalized Knowledge and Perspectives

Although evaluated interventions typically targeted vulnerable populations of some sort (low-income, rural, indigenous, landless, or nomadic households), **most evaluations failed to systematically incorporate local and indigenous knowledge outside of participants' experiences with a given intervention.** Our assessment of the evaluations' use of local knowledge is based on adherence to the principles of culturally responsive indigenous evaluation (CRIE), which include close collaboration and consultation with indigenous communities (for example, in developing data collection instruments and validating evaluation findings), meaningful involvement of indigenous academics in the evaluation team, and consideration of indigenous legal frameworks in the design of the evaluation and reporting of results (Bowman & Dodge-Francis, 2018). None of the evaluations included in the synthesis fully adhered to the CRIE principles, and few provided compelling evidence of incorporating even one of these principles.[10] Relatedly, many evaluations failed to report how they accounted for researcher bias or ethical considerations in engaging with participants who may represent these disadvantaged groups.

Despite the widespread failure to systematically incorporate and build on local knowledge, some evaluations did make a conscious effort to consider the unique needs and experiences of indigenous and marginalized groups. Several promising examples are provided below:

- The evaluation of the Development Fund's community-based agrobiodiversity program in Nepal identified Dalits and indigenous people as facing "complex challenges" including "access to land and inclusion in society" and considered how their circumstance interacted with program activities (Andersen, 2019a, p. 34).The evaluation of FAO's socio-ecosystem connectivity intervention in the Caribbean Region of Colombia examined the project's responsiveness to the needs, knowledge, and social structures of Afro-descendent and indigenous populations, who were the main project participants. Sixteen of the evaluation's 35 findings make explicit mention of indigenous populations (FAO, 2021b).
- The evaluation of a micro watershed management and climate-resilient agriculture intervention in Cambodia identified the project as relevant to the needs of Brao indigenous people, whose local knowledge and recommendations informed project adaptations to make land management and livelihood activities more relevant to them, since they do not rely on settled agriculture (FAO, 2021d).

While the examples above show that local and indigenous knowledge was sometimes meaningfully incorporated in evaluations on occasion, there is a need to do so far more consistently.

10 Many evaluation teams included investigators from the country in which the study took place; however, it was not specified whether these investigators were from indigenous or marginalized communities.

5

Conclusion

Overall, the process evaluations we reviewed showed that crop production, livestock, and fisheries/aquaculture interventions focused on building resilience to climate change through social adaptation, but that the lack of complementary focus on institutional or structural adaptation proved to be a barrier to sustainability of social adaptations. In addition, although many interventions incorporated elements of sustainable livelihoods in their project design, we found substantial evidence across evaluations that producer profit, cost of inputs, and overall financial viability undermined the effectiveness and sustainability of interventions. These and other gaps stemmed from weak initial needs assessments and problem identification that failed to account for the feasibility and contextual appropriateness of climate adaptations or the support needed for farmers and institutions to sustain adaptations over time. Next, we discuss this and other main evidence, evidence gaps, and barriers and facilitators to incorporating climate-adaptive practices into food production interventions.

Photo: **Gunnar Zachrisen** | Panorama

Main Evidence and Evidence Gaps

The evidence synthesized in this report is heavily concentrated in sub-Saharan Africa, and primarily includes evaluations of climate adaptation in crop production as opposed to fisheries and livestock. The climate adaptations evaluated were primarily social adaptations (educational, informational, behavioral) such as training on conservation or climate-smart agriculture. Fewer interventions included structural/physical adaptation or institutional adaptation, which is another gap in the evidence. Most of the programs evaluated were multisectoral and comprised multiple complementary interventions (for example, cash or input assistance combined with training).

Although evaluated interventions typically targeted vulnerable populations of some sort (low-income, rural, indigenous, landless, or nomadic households), most evaluations failed to systematically incorporate local knowledge outside of participants' experiences with a given intervention.

Barriers to Climate Adaptation

Climate adaptations that did not incorporate context and needs assessments were less relevant to program participants, encountered many more difficulties during implementation, and were much less likely to be sustainable. The lack of understanding of needs, capacities, and practicalities in many cases meant that projects took fundamentally inappropriate approaches for the context or left significant challenges unaddressed. Some of these difficulties that could have been expected (increased weed growth following application of conservation agriculture approaches, limited access to water) ultimately impeded implementation and the achievement of program objectives.

The lack of high-quality needs assessments also meant that the project populations were inadequately supported; for example, while many climate adaptations targeted vulnerable small-scale producers, the need for farmers and pastoralists/agropastoralists to own land to participate in activities ended up excluding the poorest participants in some cases. Insufficient attention to women's rights and roles in different contexts (for example, whether they are legally allowed to own land or livestock or whether doing so is socially acceptable) limited the effectiveness of some interventions, as did weak linkages to markets and limited profitability of climate-smart approaches. Finally, the limited duration and coverage of many programs limited their ability to achieve objectives and reduced the likelihood of long-term sustainability.

Facilitators of Climate Adaptation

Climate adaptation interventions that incorporated contextual analyses, needs assessments, and careful consideration of women's roles were far more relevant to participants than those that did not include these elements. Similarly, interventions that incorporated participatory approaches to gather community feedback and inform program adaptations were also perceived to be more relevant to participants. Demonstrating the value of the climate adaptation approach in terms of profitability and increased production facilitated uptake and buy-in, particularly when positive results were seen quickly. For women, in particular, climate-resilient livelihood activities that saved time and/or energy (for example, fuel-saving stoves) were particularly well-received.

Effective linkages with the private sector (cooperatives, lenders, and buyers) and support for small-scale producers to create market-quality products using a climate-adaptive approach were important factors in achieving project objectives. For projects that shared agroclimatic information with farmers, it was important that this information was accessible, easy to understand, and, ideally, disseminated through local channels. Both elements were more likely for projects that had strong approaches to management and coordination, including establishing reliable processes for financing and procurement and embedding ongoing operations and monitoring into existing structures. Similarly, for climate adaptations to be sustained, clear transition plans needed to be in place along with built-in mechanisms to support financing (VSLAs, for example) to continue implementing the adaptation.

Recommendations for Future Synthesis Research

We have several recommendations for future research on climate adaptation in food production:

1. First, we recommend conducting a broader synthesis of process evaluations commissioned by non-Norad partners. A larger synthesis could build on our findings while also potentially including greater geographic diversity and a wider range of adaptation approaches.
2. A second recommendation is to conduct a synthesis of specific climate adaptation approaches (for example, conservation agriculture or the dissemination of agroclimatic information) to obtain a more nuanced understanding of the barriers and facilitators per adaptation type.

3. Thirdly, given the dearth of local knowledge incorporated in the evaluations synthesized for this study, we suggest an evidence synthesis focusing on evaluations of climate adaptations that incorporated CRIE or other recognized methods for incorporating local knowledge to identify best practices in doing so.
4. Lastly, future evaluation mapping and evidence syntheses should explore the costs and profitability of different climate adaptation approaches and the availability of such data. We identified the lack of profitability as a key barrier to effectiveness; therefore, it would be important to look across evaluations to understand whether certain types of climate adaptations are more profitable than others. Consolidating data on intervention and activity costs would inform future programming decisions.

Photo: **Marthe Lid** | Norad

Appendix A

Terms of References

Mapping and evidence synthesis of process evaluations of climate adaptation in food production

1. Introduction

Food production and food security interventions, affect climate and the environment and is affected by climate change. Currently, food security is also worsening globally due to the Covid-19 pandemic and the war in Ukraine which affect global food production. The latest food security report (Food Security Information Network 2022:6) states that "close to 193 million people [are] acutely food insecure and in need of urgent assistance across 53 countries/territories", and the number of people living with food insecurity have increased by 80 % since 2016.

Climate change can contribute to even higher numbers in the years to come. The poorest of the poor are worsely affected by climate change. "Global hotspots of high human vulnerability are found particularly in West-, Central- and East Africa, South Asia, Central and South America, Small Island Developing States and the Arctic" (IPCC 2022:SPM12) Farmers faced by climate change will have to adapt or move. In addition, current practices also need to mitigate climate change, or at least not contribute to the crisis.

We also have an environmental crisis with "ecosystems and biodiversity showing rapid decline", and "more species [faced] with global extinction now than ever before" (IPBES 2019:11) and "Globally, local varieties and breeds of domesticated plants and animals are disappearing. This loss of diversity, including genetic diversity, poses a serious risk to global food security by undermining the resilience of many agricultural systems to threats such as pests, pathogens and climate change." (IPBES 2019:12). The environmental crisis is exacerbated by climate change, and according to the IPCC AR6 climate change is altering ecosystems, causing local species loss and may have resulted in the first climate driven extinctions of animals and plants (IPCC 2022:TS-9).

The latest report from the Intergovernmental Panel on Climate Change stresses that climate change, ecosystems and human society are interconnected and interlinked and that (IPCC 2022:TS-3); "The interconnectedness of human society, ecosystems and climate change means that the way we adapt to

climate change affects both social progress and eco-systems, and that mode of adaptation can increase or decrease climate risk and resilience needed to tackle further changes." For example, inequity is believed to constitute a climate risk, as unequal societies are less resilient to climate change (IPCC 2022:TS-20), adverse effects on eco-systems can further exacerbate problems in food production and so forth. Furthermore, "inappropriate responses to climate change create long-term lock-in of vulnerability, exposure, and risks that are difficult and costly to change (very high confidence) and exacerbate existing inequalities for Indigenous Peoples and vulnerable groups, impeding achievement of SDGs, increasing adaptation needs, and shrinking the solution space (high confidence)." (IPCC 2022:T3-58)

Food security is a key priority area for the Norwegian government, which is also working on unifying its policies on climate and the environment and its development policy.[1] The Norwegian government plans to strengthen its efforts on food security in development cooperation, of which food production is an important element. The Norwegian Agency for Development Cooperation (Norad) that manages a large part of this aid, practices results-based management which aims to use evidence to improve management, including knowledge from evaluations and research. There is also focus on strategic dialogue through which partners should have good systems in place for monitoring and evaluation. Given the large number of partners involved in this aid, there is a need for a synthesis of knowledge and an overview of relevant evaluations.

To meet this need, the Department for Evaluation will conduct a synthesis of evidence of implementation of food production interventions. The synthesis is developed in response to learning needs identified through consultations with stakeholders. A synthesis of process evaluations may inform the implementation of Norwegian development policy and inform future knowledge- and learning plans.

This is part of a larger effort on food security where the department will a) synthesise knowledge (as documented through these terms of references), b) analyse the current food-security portfolio and c) investigate long-term effects of food-security aid.

2. Monitoring and evaluation for improved climate adaptation in food production

Monitoring and evaluation of adaptation measures are believed to be an integral part of the adaptation process (IPCC 2022:TS-7) as it can be used directly to improve projects in terms of how these affect food production and how projects interact with eco-systems and affect social progress. Evaluations are also seen as an important accountability tool to ensure that "justice, ecological health and multi-sector considerations" are incorporated in approaches to adaptation (IPCC 2022:TS-67).

A recently published evidence gap-map on food production interventions found that there is a rich evaluation literature on the effects of food systems interventions on health outcomes, food production and some evidence on income received, but that there is less information (in the form of impact evaluations) for example on climate and environmental impacts and female empowerment and so forth. (Moore, Lane et al. 2021:iv).

However, while these evaluations establish a credible causal relationship between the intervention and specific outcomes, less is known about implementation of these projects in the form of a synthesis of high-quality process evaluations. It is difficult to understand whether implementation is successful without a carefully designed process evaluation that considers interlinkages between the food production intervention, ecosystem, and social progress (for example inequality, poverty etc.) in a specific context.

Evaluations that consider implementation, including process evaluations may contain valuable information to explain why implementation fails or succeeded. Various implementation elements that can affect

1 See the Government's political platform (The Hurdal-platform).

project outcomes include problem analysis, program design, institutional structures and processes, context and external factors, as well as other more specific implementation aspects (Dixon and Bamberger 2022). Furthermore while we have rich evidence on projects that target small -incremental and reactive measures; evidence of transformative adaptation in human systems is limited (high confidence). "(IPCC 2022:TS-55)

Successful implementation in this synthesis means among other things, that food production is adapted to the climate in the long-term and does not increase climate risk in the long- or short term. See also discussion of climate adaptation in report AR6 from the Intergovernmental panel on climate change that stress the importance of understanding the relationship between climate change, human society, and the environment (IPCC 2022). According to this report climate risk can increase in the case of maladaptation – where social progress or eco-systems are harmed due to the intervention. Ideally climate adaptation interventions should affect both social progress and ecosystems positively as this will reduce climate risks in the long-term. In addition, local voices, including indigenous people should be consulted to learn what success means according to their perspective.

3. Purpose

The purpose of this synthesis study is firstly to contribute to the body of knowledge related to implementations of climate adaptation in food production interventions through synthesizing existing evidence mainly from process evaluations[2] undertaken by key food security[3] partners, and secondly to learn more about the important exercise of evaluation of this topic conducted by the same key partners.

The intended user groups of this synthesis are sections in the Ministry of Foreign Affairs and Norad that work with food security in development policies and cooperation. The synthesis could also be of interest to other bilateral donors, multilateral organizations working on the topic, civil society organizations, academia, and the public.

For the intended users, the synthesis can make evidence from evaluations of key partners more available and provide easy access in-depth reading of evaluations of particular interest. This knowledge can for example be used in policy development and implementation, for portfolio management and for on-going partner dialogue. It can also assist in the development of new 'knowledge and learning plans'[4]. Finally, it can also be used in general communication with the Norwegian public.

2 Or other types of evaluation that analyse implementation.

3 "Food security, as defined by the United Nations' Committee on World Food Security, means that all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life." "https://www.ifpri.org/topic/food-security#:~:text=Food%20security,%20as%20defined%20by,an%20active%20and%20healthy%20life."

4. Objectives

Inception phase

- Map evaluations of implementation of climate adaptation in food production interventions, commissioned by key Norwegian food security partners to examine the extent, range, and nature of the available evidence.
- Propose evaluations for inclusion in the synthesis study.

Synthesis phase

- Map content of evaluations included in the synthesis study (ref. mapping questions 1-3 below)
- Synthesize findings from these evaluations on the barriers and facilitators to successful implementation of these initiatives (ref. synthesis question 4 below).

4 Norad is developing knowledge and learning plans for portfolios.

5. Key questions for synthesis phase:

Mapping:

1. To what extent is implementation of climate adaptation in food production interventions included in publicly available evaluations undertaken by Norway's key partners (multilateral and NGOs) since 2000?
2. What types of issues do these evaluations aim to uncover and what is the extent, range, and nature of available evidence (see section 1 and 2 on background and context)? For example, time perspective and consequences for social progress, including poverty alleviation, and ecosystems etc.
3. To what extent do these evaluations build on local knowledge, including indigenous knowledge and meaningful inclusion of vulnerable groups?

Synthesis

4. What are the barriers to -, and facilitators for successful implementation of the initiatives evaluated?

6. Scope

The synthesis is limited to evaluations of climate adaptation in food production interventions. Focus is on evaluations that look at interventions targeting SDG 2.3[5] or if these pre-dates the SDGs, has an equivalent objective, and that involves climate adaptation.

Of particular interest are evaluations that target food production through small-scale producers while also pursuing climate adaptation. If the number of evaluations is sufficient the synthesis may focus solely on these evaluations.

Evaluation included should focus on the implementation of interventions. It is possible that this will mainly include process evaluations and formative evaluations, however impact evaluations and other evaluations can also be included if they contain process-evaluation elements.

5 Target 2.3: "By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment." Even though SDG 2.3 was launched in 2015, the cut-off point is 2000. This should not pose a problem for the mapping, as focus is on the content of SDG 2.3. Hence evaluations need not mention SDG 2.3 to be included.

Only evaluations commissioned by key partners (multilateral[6] and NGOs[7]) that are supported by Norway are included. The choice to focus on key partners as opposed to all evaluations on this topic is to learn more about the evaluations of key partners.

Evaluations should be published in English or French and be publicly available, between 2000 and 2020. If the number of evaluations is substantial, this could be limited to 2010-2020.

7. Limitations

The evidence synthesis focuses on evaluations commissioned by key Norwegian partners. This choice means that the findings will provide an overview of findings from these partners and not give a complete picture of the evidence on this topic. The final report should make this clear when synthesis findings are presented, to avoid bias in interpretation.

While the synthesis will consider the robustness of qualitative findings before they are synthesised, the team will not conduct a full quality assessment of impact evaluations included. This means that we will not know whether outcome and impact claims in the evaluations

6 FAO, WFP, Ifad, the World Bank and the African Development Bank

7 The Development Fond in Norway (Utviklingsfondet), Norwegian Church Aid (Kirkens Nødhjelp), Care, Digni, Caritas, Royal Norwegian Society for Development (Norges Vel) and Norwegian Church Aid (Norsk Folkehjelp).

surveyed are credible. The review team should discuss the extent to which this affects synthesis conclusions of qualitative findings.

8. Methodology

The chosen mapping and synthesis methods should be described in detail and respond to the mapping and synthesis questions. The inception report should describe the methodology in detail, including a description of the review process, inclusion criteria, process for screening, data extraction and storage and process for interpretative synthesis.

The consultants should use a suitable software to store and analyse findings, for example Nvivo or similar. The methodology also needs to include a tool for the assessment (protocol for assessment) of the robustness of findings. The protocol could include how you plan to apply the GRADE-CERQual approach to assess how much confidence to place in the review findings, and use of a GRADE-CERQual Summary of Qualitative Findings Table to summarize the review findings and confidence assessments.

Deliverables

Inception phase

- Draft inception report of maximum 30 pages, excluding annexes, which details the methods for synthesis and a tool for reliability assessment (protocol) of single evaluations, and a detailed proposal for collection and mapping of evaluations and synthesis of evaluation findings.
- Final inception report with a list of all screened and included evaluations.

Synthesis phase

The synthesis phase is subject to the approval of the inception phase:

- A draft synthesis-report, including executive summary (maximum 50 pages, excluding annexes).
- A final synthesis-report.
- Presentation of the synthesis report in Oslo. (To be decided in the discussion of phase two.)

All reports shall be prepared in accordance with the Department for Evaluation's guidelines[8] and shall be submitted in electronic form in accordance with the progress plan specified in the tender documents or in the approved inception report.

8 Evaluation guidelines (norad.no) in annex 6 to the tender document. https://www.norad.no/en/front/evaluation/about-evaluation-department/evaluation-guidelines/

9. Ethics

All parts of the assignment shall adhere to recognised evaluation principles and the OECD Development Assistance Committee's quality standards for development evaluation, as well as relevant guidelines from the Department for Evaluation. It is expected that the assignment is carried out according to accepted research and evaluation ethics and the evaluation shall be undertaken with integrity and honesty and ensure inclusiveness of views. Ethical considerations shall be documented throughout the synthesis processes.

10. Conduct of the synthesis

The synthesis process will be managed by the Department for Evaluation in Norad. The synthesis team will report to the Department for Evaluation through their team leader. The team leader shall be in charge of all deliveries and will report to the Department for Evaluation on the team's progress, including any problems that may jeopardise the assignment. The Department for Evaluation and the team shall emphasise transparent and open communication with stakeholders. Regular contact between the Department for Evaluation, team and stakeholders will allow for discussion of any arising issues and ensuring a participatory process.

All decisions concerning the interpretation of this Terms of Reference, and all deliverables are subject to approval by the Department for Evaluation.

In addition, experts or other relevant parties may be invited to comment on reports or specific issues during the process. The evaluation team shall take note of all comments received from stakeholders. Where there are significant divergences of views between the evaluation team and stakeholders, this shall be reflected in the final report. Quality assurance shall be provided by the institution delivering the consultancy services prior to submission of all deliverables.

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Appendix C

Search strings

» **Phenomenon of interest**: Climate OR ecosystem OR environment OR biodiversity OR "agro-biodiversity" OR "ecological health" OR "global warming" OR "earth warming" OR "ocean acidification" OR "locust outbreak" OR "pest outbreak" OR rain OR rainfall OR hurricane OR cyclone OR "sea level rise" OR "water temperature rise" OR "water temperature change" OR maladaptation OR "crop failure" OR extinction OR flood* OR drought OR "extreme heat" OR "weather*conditions" OR "extreme*weather events" OR "greenhouse gas emissions" OR GHG OR "carbon sequestration" OR "CO2 emissions" OR "fishery management" OR vulnerability OR agro-ecology

» **Intervention**: "food production" OR "crop production" OR "crop yield" OR "food security" OR "food safety" OR "food diversity" OR "food diversification" OR food OR crop "inter cropping" OR seeds OR breeds OR animals OR husbandry OR livestock OR fertilizers OR soil OR manure OR pesticides OR mulching OR irrigation OR agriculture OR agroforestry OR "agricultural extension" OR farming OR "land*use" OR harvest OR nutrition OR aquaculture OR fish OR fisheries OR fishing OR Tilapia OR seaweed OR "sea cucumber" OR "crop adaptation" OR "genetic variation" OR "climate smart" OR "climate adapted" OR "climate adaptation" OR "climate resilient" OR "climate robust" OR resilience OR "microclimate restoration" OR "adaptive*capacity" OR "conservation agriculture" OR "plant genetic resources" OR "GHG emission reductions" OR "GHG mitigation" OR "Paris Agreement"

» **Evaluation**: Evaluation OR monitoring OR "process evaluation" OR "performance evaluation" OR "performance assessment" OR "interim evaluation" OR "midterm evaluation" OR "implementation research" OR "implementation science" OR "fidelity of implementation" OR formative OR "midterm review" OR "developmental evaluation" OR "participatory evaluation" OR "participatory design" OR "action research" OR "technical follow-up" OR "peer-to-peer learning" OR "peasant to peasant" OR P2P OR "campensina-a-campensina" OR "systematic review" OR "rapid review" OR "evidence synthesis" OR qualitative OR "lessons learned" OR experiences OR insights OR perspectives OR perceptions

Because the initial meeting with the Department for Evaluation in Norad identified LMICs as the geographical scope of this study, we include a **"population"** category in our PIE framework to focus on the target populations in low- and middle-income countries. We include all key terms referring to LMICs as well as the specific country names to ensure geographical comprehensiveness.

» **Population I**: "low* income countr*," OR "middle* income countr*," OR "developing countr*," OR "less* developed countr*," OR "underdeveloped countr*," OR "under developed countr*," OR "underserved countr*," OR LMIC*, OR "low GDP," OR "low GNP," OR "fragile state," OR "third world," OR "transitional countr*," OR "high* burden countr*" OR Asia, OR "South Asia*," OR Africa, OR "Latin America," OR "South America," OR "Central America," OR "Middle East," OR "Sub-Saharan Africa," OR "Sub Saharan Africa," OR Caribbean, OR "West Indies" OR

Afghanistan*, OR Albania, OR Algeria, OR "American Samoa," OR Angola*, OR Argentina, OR Armenia*, Or Azerbaijan, OR Bangladesh*, OR Belarus, OR Belize, OR Benin, OR Bhutan*, OR Bolivia*, OR Bosnia, OR Botswana, OR Brazil, OR Bulgaria, OR Burkina Faso, OR Burundi, OR Cabo Verde, OR Cameroon, OR Cambodia*, OR "Central African Republic*," OR Chad, OR China, OR Colombia, OR Comoros, OR Cote d'ivoire, OR "Ivory Coast," OR Congo*, OR Costa Rica, OR Cuba, OR "Democratic Republic of the congo," OR DRC OR "Democratic people's Republic of Korea," OR Djibouti, OR Dominica, OR "Dominican Republic," OR Ecuador, OR Egypt*, OR El Salvador, OR Eritrea, OR Eswatini, OR Ethiopia*, OR "Equatorial Guinea," OR Fiji, OR Gabon, OR Gambia*, OR Gaza, OR Georgia, OR Ghana*, OR Grenada, OR Guatemala*, OR Guam, OR Guinea*,OR Guyana, OR Haiti*, OR Hondura*, OR India*, OR Indonesia*, OR Iran, OR Iraq, OR Jamaica, OR Jordan, OR Kazakhstan, OR Kenya*, OR Kiribati, OR Korea*, OR Kosovo, OR Kyrgyz*, OR Lao*, OR PDR, OR Lebanon, OR Lesotho, OR Liberia*, OR Libya, OR Madagascar, OR Malawi*, OR Malaysia, OR Maldives, OR Mali, OR "Marshall Islands," OR Mauritius, OR Mauritania*, OR Mexico, OR Micronesia, OR Moldova*, OR Mongolia*, OR Montenegro, OR Morocc*, OR Mozambique, OR Burma, OR Myanmar, OR Myanma, OR Namibia, OR Nepal*, OR Nicaragua, OR Niger, OR Nigeria*, OR "North Macedonia," OR Palau, OR Pakistan*, OR Paraguay, OR Peru, OR Philippines, OR Philipines, OR Phillipines, OR Phillippines, OR "Papua New Guinea," OR "Republic of Congo," OR Rwanda, OR Russian Federation, OR Samoa, OR Sao Tome and Principe, OR Senegal*, or Serbia, OR Sierra Leone, OR Sri Lanka, OR Solomon Islands, OR Somalia*, OR "South Africa*," OR "South Sudan," OR Sudan, OR St. Lucia, OR St. Vincent, OR Swaziland, OR Suriname, OR Syria*, OR Tajikistan, OR Tanzania*, OR Thailand, OR Timor-Leste, OR Tokelau, OR Togo, OR Tonga, OR Tunisia, OR Turkey, OR Turkmenistan, OR Tuvalu, OR Uganda*, OR Ukraine, OR Uzbekistan, OR Vanuatu, OR Vietnam*, OR Viet Nam, OR "West Bank," OR Yemen, OR Zambia*, OR Zimbabwe

We will combine Population I focused on geographical scope with the beneficiary populations targeted by the interventions/evaluations. Based on decisions from the kick-off meetings, we identified the following search terms to find studies with the relevant target populations.

» **Population II**: farmer OR peasant* OR producer OR smallholder OR fisher* OR agropastoralists OR "agro pastoralists" OR "coastal communities" OR stakeholder

To center **the perspectives and experiences of local and/or disadvantaged communities**, we will include **the following groups in our coding framework in the synthesis phase:** Indigenous, women, gender, marginalized, vulnerable, disadvantaged, low-income, poor, disabled, youth

Finally, a central inclusion criterion for the synthesis is that evaluations must be "**commissioned by key food security partners** in developing countries supported by Norway". As such, to eliminate any studies not directly relevant to this assignment, we include the following search terms to ensure that our database search surfaces evaluations commissioned by Norway's key food security partners in developing countries only.

» **Funders and/or Implementing Partners:** Norway OR Norwegian OR "Norwegian Agency for Development Cooperation" OR Norad OR "Food and Agriculture Organization" OR FAO OR "World Food Program" OR "World Food Programme" OR WFP OR "International Fund for Agricultural Development" OR IFAD OR "World Bank" OR WB OR "African Development Bank" OR ADB OR AfDB OR AFDB OR "Development Fund" OR "Nordic Development Fund" OR NDF OR Utviklingsfondet OR "Norwegian Church Aid" OR " NCA OR "Kirkens Nødhjelp" KN OR "Norwegian People's Aid" OR NPA OR "Norsk Folkehjelp" OR NF OR CARE OR Digni OR Caritas OR "Royal Norwegian Society for Development" OR "Norges Vel"

Appendix D

Revised Critical Appraisal Protocol

Number	Main question	Sub-questions
1	Clear statement of research.	a. Research goal clearly stated*
2	Appropriateness of qualitative methodology	a. Research interprets or illuminates the actions and/or subjective experiences of research participants b. Is qualitative research the right methodology for addressing the research goal?*
3	Research design addresses the aims of the research	a. Research is guided by research questions or hypotheses* b. Researcher convincingly justified the overall design (e.g., methods, approach, locations, timing)* c. Researcher constructs or uses a conceptual framework
4	Recruitment strategy	a. Participant selection process is explained* b. Explanation of why selected participants were the most appropriate to provide relevant knowledge
5	Was the data collected in a way that addressed the research issue?	a. Setting for data collection was justified b. Clear how data were collected (e.g. focus group, semistructured interview)* c. Methods are explicit (e.g., indication of how interviews were conducted, topic guide)* e. Form of data is clear (e.g., tape recordings, video material, notes etc.)
6	Has the relationship between researcher and participants been adequately considered?	a. Consider if the researcher critically examined their own role and potential bias and influence during a. Formulation of research questions and research instruments (e.g., asking leading questions); b. Data collection, including sample recruitment and location b. Study declares sources of support/funding

Number	Main question	Sub-questions
7	Have ethical issues been taken into consideration?	a. Details of how the research was explained to participants to show how researcher maintained ethical standards b. Researcher discussed how study handled sensitive issues (e.g., informed consent, confidentiality, how they handled the effects of the material on participants during and after the study) c. Indication that approval was sought from an ethics committee
8	Was the data analysis sufficiently rigorous?	a. Thorough description of the analysis process* b. Clear how categories/themes were determined for thematic analysis (i.e., deductive and/or inductive processes were clearly explained). c. Researcher explains how the data presented were selected from the sample to illustrate a finding (e.g., prevalence, deviance) d. Sufficient data are presented to support findings* e. Extent to which contradictory data are taken into account f. Researcher examined their own role, potential bias, and influence during analysis and selection of data for presentation g. Researcher considered contextual factors which may have influenced the research results (e.g., urban, rural, country context) h. Research clearly includes study limitations
9	Is there a clear statement of findings?	a. Findings are explicit* b. Adequate discussion of the evidence both for and against the researcher's interpretations c. Researcher discussed the credibility of their findings (e.g., triangulation, respondent validation, more than one analyst) d. Findings are discussed in relation to original research questions*

Appendix E

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Appendix F

CERQual Evidence Profile

RELEVANCE		
Finding 1: Project designers and implementers' limited understanding of local context and failure to consult with beneficiaries reduced the relevance of climate adaptation activities, which did not adequately identify or respond to community problems.		
Studies contributing to the review finding	• NCG, 2017 • Andersen, 2019b • Euker and Reichel, 2012 • IFAD, 2022b • FAO, 2022b	• IFAD, 2022c • The Development Fund, 2012 • IFAD, 2017a • FAO, 2021d
Assessment components		
Methodological limitations	Minor methodological limitations (8 studies with minor and 1 study with moderate methodological limitations)	
Coherence	No or very minor concerns about coherence	
Adequacy	Minor concerns about adequacy (9 studies in total, with rich data)	
Relevance	No or very minor concerns about relevance (9 studies with direct relevance from a total of 18 countries in 5 regions)	
Overall assessment of confidence in the evidence and explanation		
High confidence	9 studies with no or very minor concerns regarding methodological limitations, coherence, adequacy, and relevance.	

Finding 2: The need for farmers and pastoralists/agropastoralists to own land excluded the poorest, including disadvantaged groups such as women and youth.		
Studies contributing to the review finding	• IFAD, 2017a • IFAD, 2012a • IFAD, 2012c • IFAD, 2012b • IFAD, 2020b • IFAD, 2022a • IFAD, 2022b	• FAO, 2017 • The Development Fund, 2015a • The Development Fund, 2015b • Development Alternatives Incorporated, 2020 • World Bank, 2016
Assessment components		
Methodological limitations	Moderate methodological limitations (8 studies with minor and 4 studies with moderate methodological limitations)	
Coherence	No or very minor concerns about coherence	
Adequacy	No or very minor concerns about coherence	
Relevance	No or very minor concerns about coherence	
Overall assessment of confidence in the evidence and explanation		
High confidence	12 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	
Finding 3: Projects with limited knowledge and context analysis regarding men and women's different roles and needs were less relevant to women.		
Studies contributing to the review finding	• FAO, 2017 • FAO, 2021a • IFAD, 2017a • IFAD, 2020b • IFAD, 2022a	• IFAD, 2021 • The Development Fund, 2012 • The Development Fund, 2015a • The Development Fund, 2015b • WFP Sri Lanka, 2021

Finding 3 (continued): Projects with limited knowledge and context analysis regarding men and women's different roles and needs were less relevant to women.	
Assessment components	
Methodological limitations	Moderate methodological limitations (6 studies with minor and 4 studies with moderate methodological limitations)
Coherence	No or very minor concerns about coherence
Adequacy	No or very minor concerns about coherence
Relevance	No or very minor concerns about relevance (10 studies with direct relevance from a total of 12 countries in 3 regions)
Overall assessment of confidence in the evidence and explanation	
High confidence	10 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.

Finding 4: Interventions most relevant to the needs of poor women focused on diversifying their livelihoods and improving their access to energy-efficient resources and practices to increase resilience to climate change.		
Studies contributing to the review finding	• WFP Sri Lanka, 2021 • FAO, 2021d • CARE Ethiopia, 2021 • TSA, 2017	• Andersen, 2019b • Andersen, 2019c • The Development Fund, 2015a • FAO, 2016b
Assessment components		
Methodological limitations	Minor methodological limitations (6 studies with minor and 2 studies with moderate methodological limitations)	
Coherence	No or very minor concerns about coherence	
Adequacy	Moderate concerns about adequacy (8 studies in total with limited, thin data)	
Relevance	Moderate concerns about relevance (8 studies from 5 countries in 3 regions—6 studies in Sub-Saharan Africa and only 1 study in South Asia and 1 study in East Asia and Pacific)	
Overall assessment of confidence in the evidence and explanation		
Moderate confidence	Downgraded to moderate confidence because of moderate concerns about adequacy and relevance.	

EFFICIANCY		
Finding 6: Barriers to project efficiency often stemmed from delays caused by funders and contracting officers.		
Studies contributing to the review finding	• FAO, 2018a • FAO, 2018b • Peham, 2017 • IFAD, 2017a • IFAD, 2018a • FAO, 2017 • FAO, 2016b	• FAO, 2021d • Andersen, 2019b • Djedjebi, 2016 • WFP Kenya, 2022 • LTS International, 2020 • The Development Fund 2015a • The Development Fund, 2015b
Assessment components		
Methodological limitations	Minor methodological limitations (10 studies with minor and 4 studies with moderate methodological limitations)	
Coherence	No or very minor concerns about coherence	
Adequacy	No or very minor concerns about adequacy	
Relevance	No or very minor concerns about relevance	
Overall assessment of confidence in the evidence and explanation		
High confidence	14 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	
Finding 8: Evaluations of crop production interventions indicated that farmers did not find climate data—which have high potential to help producers—to be easily understood nor accessible.		
Studies contributing to the review finding	• Diarra & Monimart, 2012 • DeVries et al., 2019 • Euker & Bolte, 2015	• Longley et al., 2019 • FAO, 2016a
Assessment components		
Methodological limitations	No or very minor concerns about methodological limitations (all 5 studies with very minor concerns)	

Finding 8 (continued): Evaluations of crop production interventions indicated that farmers did not find climate data—which have high potential to help producers—to be easily understood nor accessible.	
Coherence	Moderate concerns about coherence (Some concerns about the consistency of the relevant data within and across studies)
Adequacy	Serious concerns about adequacy (5 studies in total with limited, thin data)
Relevance	Moderate concerns about relevance (Partial relevance because the studies were from 5 countries in only 2 regions—4 studies in Sub-Saharan Africa and 1 study in East Asia and Pacific)
Overall assessment of confidence in the evidence and explanation	
Moderate confidence	Downgraded to low confidence because of moderate concerns about coherence and relevance and serious concerns about adequacy.
Finding 9: Efficient management of procurement, resources, and technical staff enabled projects to focus on the technical aspects of implementation.	
Studies contributing to the review finding	• FAO, 2016b • FAO, 2019 • FAO, 2020 • FAO, 2022a • IFAD, 2017b • IFAD, 2019 • IFAD, 2021 • Peham, 2017 • FAO & WFP, 2019 • Norges Vel, 2019 • WFP Uganda, 2016 • WFP Malawi, 2021 • WFP Office of Evaluation, 2016 • The Development Fund, 2015b
Assessment components	
Methodological limitations	Minor methodological limitations (13 studies with minor and 1 study with moderate methodological limitations)
Coherence	No or very minor concerns about coherence
Adequacy	No or very minor concerns about adequacy
Relevance	No or very minor concerns about relevance
Overall assessment of confidence in the evidence and explanation	
High confidence	14 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.

Finding 10: Using monitoring to adapt program implementation contributed to increased usefulness and efficiency.		
Studies contributing to the review finding	• FAO, 2019 • FAO, 2020 • FAO, 2021a • FAO, 2021b • FAO, 2021c • FAO, 2021d • FAO, 2022b • IFAD, 2012c	• IFAD, 2022b • CARE Ethiopia, 2021 • Diarra & Monimart, 2012 • Lewin & Abdi, 2022 • Euker & Reichel, 2012 • The Development Fund, 2015a • The Development Fund, 2019
Assessment components		
Methodological limitations	Minor methodological limitations (14 studies with minor and 1 study with moderate methodological limitations)	
Coherence	No or very minor concerns about coherence	
Adequacy	No or very minor concerns about adequacy	
Relevance	No or very minor concerns about relevance	
Overall assessment of confidence in the evidence and explanation		
High confidence	15 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	
Finding 13: Although the multi-sectoral nature of climate programming necessarily implicates several government and civil society actors, the failure to articulate agency roles or identify a coordinating body led project staff to report inefficient collaboration, delays, and reduced buy-in.		
Studies contributing to the review finding	• IFAD, 2020b • FAO, 2020 • FAO, 2021b • FAO, 2021d • DeVries et al., 2019	• Longley et al., 2019 • World Bank, 2014 • Euker & Bolte, 2015 • WFP Sri Lanka, 2021 • Lewin & Abdi, 2022

Finding 13 (continued): Although the multi-sectoral nature of climate programming necessarily implicates several government and civil society actors, the failure to articulate agency roles or identify a coordinating body led project staff to report inefficient collaboration, delays, and reduced buy-in.	
Assessment components	
Methodological limitations	Minor methodological limitations (8 studies with minor and 2 studies with moderate methodological limitations)
Coherence	No or very minor concerns about coherence
Adequacy	No or very minor concerns about adequacy
Relevance	No or very minor concerns about relevance (10 studies with direct relevance from a total of 10 countries in 4 regions)
Overall assessment of confidence in the evidence and explanation	
High confidence	10 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.

Finding 16: In evaluations of crop production, livestock, and fisheries interventions, stakeholders at all levels identified the importance of capitalizing on in-country technical expertise by involving research institutions, producer organizations, and extension workers in planning, implementation, or as project participants.		
Studies contributing to the review finding	• FAO, 2018a • FAO, 2018b • FAO, 2019 • FAO, 2021a • FAO, 2022b • Andersen, 2019c • CARE Ethiopia, 2021	• Euker & Reichel, 2012 • LTS International, 2020 • WFP Sri Lanka, 2021 • WFP Office of Evaluation, 2016 • WFP South Sudan, 2021 • Westengen, 2016
Assessment components		
Methodological limitations	Minor methodological limitations (10 studies with minor and 3 studies with moderate methodological limitations)	
Coherence	No or very minor concerns about coherence	
Adequacy	No or very minor concerns about adequacy	
Relevance	No or very minor concerns about relevance	

Finding 16 (continued): In evaluations of crop production, livestock, and fisheries interventions, stakeholders at all levels identified the importance of capitalizing on in-country technical expertise by involving research institutions, producer organizations, and extension workers in planning, implementation, or as project participants.		
Overall assessment of confidence in the evidence and explanation		
High confidence	13 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	
Finding 18: Evaluators sometimes concluded that adherence to a shared climate adaptation approach (e.g., CSA, value chain) between multiple projects facilitated coordination between them.		
Studies contributing to the review finding	• FAO & WFP, 2019 • IFAD, 2021 • Longley et al., 2019	• Diarra & Monimart, 2012 • WFP Malawi, 2021
Assessment components		
Methodological limitations	No or very minor concerns about methodological limitations (all 5 studies with very minor concerns)	
Coherence	No or very minor concerns about coherence	
Adequacy	Serious concerns about adequacy (5 studies in total with limited, thin data)	
Relevance	Moderate concerns about relevance (Partial relevance because the studies were from 4 countries in only 2 regions—4 studies in Sub-Saharan Africa and 1 study in South Asia)	
Overall assessment of confidence in the evidence and explanation		
Moderate confidence	Downgraded to moderate confidence because of moderate concerns about relevance and serious concerns about adequacy.	
Finding 20: Evaluators found that successful private sector partnerships were more likely to emerge when crop production and fisheries interventions worked to strengthen the capacity of producer cooperatives according to a value chain approach.		
Studies contributing to the review finding	• AIR Consult, 2015 • FAO & WFP, 2019 • FAO, 2022b	• Norges Vel, 2019 • IFAD, 2020b
Assessment components		
Methodological limitations	Minor methodological limitations (4 studies with minor and 1 study with moderate methodological limitations)	

Finding 20 (continued): Evaluators found that successful private sector partnerships were more likely to emerge when crop production and fisheries interventions worked to strengthen the capacity of producer cooperatives according to a value chain approach.	
Coherence	No or very minor concerns about coherence
Adequacy	Serious concerns about adequacy (5 studies in total with limited, thin data)
Relevance	Moderate concerns about relevance (Partial relevance because the studies were from 10 countries in only 2 regions, 4 studies in Sub-Saharan Africa and 1 study in Latin America and Caribbean)
Overall assessment of confidence in the evidence and explanation	
Moderate confidence	Downgraded to moderate confidence because of moderate concerns about relevance and serious concerns about adequacy.

EFFECTIVENESS		
Finding 23: Farmers, agropastoralists, and pastoralists were reluctant or unable to apply improved agricultural techniques such as crop rotation, minimal tilling, mulching, and cover crops.		
Studies contributing to the review finding	• FAO, 2016a • FAO, 2016b • LTS Africa, 2018 • Eucker & Reichel, 2012 • NCG, 2017	• FAO, 2021d • IFAD, 2017b • FAO, 2022a • Andersen, 2019b
Assessment components		
Methodological limitations	No or very minor concerns about methodological limitations (all 9 studies with minor methodological limitations)	
Coherence	No or very minor concerns about coherence	
Adequacy	Minor concerns about adequacy (9 studies in total with rich data)	
Relevance	Minor concerns about relevance (9 studies from a total of 7 countries in 2 regions—7 studies in Sub-Saharan Africa and 2 studies in East Asia and Pacific)	
Overall assessment of confidence in the evidence and explanation		
High confidence	9 studies with no or minor concerns regarding methodological limitations, coherence, adequacy, and relevance.	
Finding 25: Evaluators of crop production, livestock, and fisheries interventions identified that climate adaptation interventions failed to fully consider women's roles and rights (for example, to land and livestock ownership) which ultimately precluded their full participation and uptake.		
Studies contributing to the review finding	• IFAD, 2020b • IFAD, 2022b • CARE Ethiopia, 2021 • IFAD, 2021 • DeVries et al, 2019 • FAO, 2022b • WFP Kenya, 2022	• World Bank, 2016 • LTS Africa, 2018 • FAO, 2019 • Longley et al, 2019 • WFP Office of Evaluation, 2016 • The Development Fund, 2012 • The Development Fund, 2015b

Finding 25 (continued): Evaluators of crop production, livestock, and fisheries interventions identified that climate adaptation interventions failed to fully consider women's roles and rights (for example, to land and livestock ownership) which ultimately precluded their full participation and uptake.	
Assessment components	
Methodological limitations	Minor methodological limitations (12 studies with minor and 2 studies with moderate methodological limitations)
Coherence	No or very minor concerns about coherence
Adequacy	No or very minor concerns about adequacy
Relevance	No or very minor concerns about relevance
Overall assessment of confidence in the evidence and explanation	
High confidence	14 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.

Finding 27: Smallholders' uptake of climate-adaptive crop production approaches was more consistent when positive results were achieved quickly.		
Studies contributing to the review finding	• FAO, 2017 • World Bank, 2014 • WFP Sri Lanka, 2021	• WFP South Sudan, 2021 • The Development Fund, 2012 • The Development Fund, 2015b
Assessment components		
Methodological limitations	Minor methodological limitations (4 studies with minor and 2 studies with moderate methodological limitations)	
Coherence	No or very minor concerns about coherence	
Adequacy	Moderate concerns about adequacy (6 studies in total with rich data)	
Relevance	Minor concerns about relevance (6 studies with direct relevance from a total of 8 countries in 3 regions)	
Overall assessment of confidence in the evidence and explanation		
High confidence	Downgraded to moderate confidence because of minor concerns regarding relevance and moderate concerns about adequacy.	

Finding 34: The limited scale and duration of climate adaptation interventions inhibited achievement of project objectives.		
Studies contributing to the review finding	• FAO, 2021d • LTS Africa, 2018 • World Bank, 2014 • Andersen, 2019a	• Andersen, 2019b • Andersen, 2019c • Westengen, 2016 • The Development Fund, 2015b
Assessment components		
Methodological limitations	Moderate methodological limitations (3 studies with minor and 5 studies with moderate methodological limitations)	
Coherence	No or very minor concerns about coherence	
Adequacy	Moderate concerns about adequacy (8 studies in total with rich data)	
Relevance	Moderate concerns about relevance (8 studies from 6 countries in 4 regions—5 studies in Sub-Saharan Africa, 1 study in South Asia, 1 study in East Asia and Pacific, and 1 study in Latin America and Caribbean)	
Overall assessment of confidence in the evidence and explanation		
Moderate confidence	Downgraded to moderate confidence because of moderate concerns about methodological limitations, adequacy, and relevance.	
Finding 36: Well-coordinated and properly timed complementary activities facilitated achievement of climate adaptation objectives, including increased production.		
Studies contributing to the review finding	• Longley et al., 2019 • WFP Malawi, 2021 • IFAD, 2022a • Development Alternatives Incorporated, 2020	• Andersen, 2019a • Lewin & Abdi, 2022 • WFP Sri Lanka, 2021 • WFP Uganda, 2016
Assessment components		
Methodological limitations	Minor methodological limitations (7 studies with minor and 1 study with moderate methodological limitations)	
Coherence	No or very minor concerns about coherence	
Adequacy	Minor concerns about adequacy (8 studies in total with rich data)	

Finding 36 (continued): Well-coordinated and properly timed complementary activities facilitated achievement of climate adaptation objectives, including increased production.	
Relevance	Minor concerns about relevance (8 studies with direct relevance from a total of 7 countries in 2 regions—6 studies in Sub-Saharan Africa and 2 studies in South Asia)
Overall assessment of confidence in the evidence and explanation	
High confidence	8 studies with minor or moderate methodological limitations. Minor concerns regarding adequacy and relevance.

SUSTAINABILITY	
Finding 38: Evaluations across target groups and intervention types found that failing to build a mechanism to continue funding activities beyond the project period was a key barrier to sustainability.	
Studies contributing to the review finding	• NCG, 2017 • Peham, 2017 • FAO, 2016b • Andersen, 2019b • Andersen, 2019c • IFAD, 2018a • IFAD, 2018b • FAO, 2021a • FAO, 2021b • FAO, 2021c • FAO, 2022a • LTS Africa, 2018 • LTS International, 2020 • KPMG International Development Advisory Services, 2022a • World Bank, 2016 • IFAD, 2022b • WFP Kenya, 2022 • Norges Vel, 2019 • CARE Ethiopia, 2021 • FAO, 2017 • Westengen, 2016 • The Development Fund, 2015a • The Development Fund, 2015b • WFP Office of Evaluation, 2016
Assessment components	
Methodological limitations	Minor methodological limitations (19 studies with minor and 5 studies with moderate methodological limitations)
Coherence	No or very minor concerns about coherence
Adequacy	No or very minor concerns about adequacy
Relevance	24 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.
Overall assessment of confidence in the evidence and explanation	
High confidence	14 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.

Finding 39: Evaluations found that programs were unsustainable when participants perceived that activities were not profitable, useful, or a priority for their business.		
Studies contributing to the review finding	• Arslan et al., 2018 • Euker & Bolte, 2015 • WFP Kenya, 2022 • FAO, 2018a • IFAD, 2017a	• WFP Sri Lanka, 2021 • FAO, 2017 • The Development Fund, 2015a • FAO, 2021d • IFAD, 2020b
Assessment components		
Methodological limitations	Minor methodological limitations (7 studies with minor and 3 studies with moderate methodological limitations)	
Coherence	No or very minor concerns about coherence	
Adequacy	Minor concerns about adequacy (10 studies in total with rich data)	
Relevance	No or very minor concerns about relevance (10 studies from a total of 10 countries in 4 regions)	
Overall assessment of confidence in the evidence and explanation		
High confidence	10 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.	
Finding 42: Building structures to increase financial viability, including credit options, private partnerships, or other ongoing funding increased the likelihood of sustainability.		
Studies contributing to the review finding	• Norges Vel, 2019 • NCG, 2017 • IFAD, 2012c • FAO, 2017 • FAO, 2019 • FAO, 2020 • FAO, 2021b • FAO, 2021c • FAO, 2021d	• FAO & WFP, 2019 • IFAD, 2022a • Lekhoaba, 2019 • LTS Africa, 2018 • IFAD, 2022b • IFAD, 2012b • Westengen, 2016 • The Development Fund, 2015a

Finding 42 (continued): Building structures to increase financial viability, including credit options, private partnerships, or other ongoing funding increased the likelihood of sustainability.	
Assessment components	
Methodological limitations	Minor methodological limitations (15 studies with minor and 2 studies with moderate methodological limitations)
Coherence	No or very minor concerns about coherence
Adequacy	No or very minor concerns about adequacy
Relevance	No or very minor concerns about relevance
Overall assessment of confidence in the evidence and explanation	
High confidence	17 studies with minor or moderate methodological limitations. No or very minor concerns regarding coherence, adequacy, and relevance.

Appendix G

Summary of Supporting Evidence for CERQual Findings, by Targeted Producer Group of the Evaluated Intervention

CERQual Finding No.	Number of Supporting Evaluations, According to Target Producer Groups*				Total Number of Supporting Evaluations
	Farmers	Fishers	Pastoralists/ Agropastoralists	Small-scale producers	
1	7	1	1	0	9
2	11	0	2	0	12
3	9	1	1	0	10
4	7	0	3	0	8
6	9	1	3	3	14
8	5	0	2	0	5
9	7	2	4	2	14
10	9	3	6	1	15
11	8	0	2	1	10
16	9	3	3	1	13
18	4	0	1	0	5
20	1	3	0	0	5
23	5	0	3	1	9
25	11	3	4	0	14
27	6	0	0	0	6
34	5	0	0	0	5
36	8	0	0	0	8
38	13	3	8	5	24
39	8	1	3	1	10
42	10	2	4	1	17

*Note: We count evaluations whose primary or secondary focus was on a given target producer group. Some evaluated interventions had more than one focus.

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