

# Promoting homestead gardens to improve dietary diversity in Rural India: a randomized controlled trial

<b>Submission date</b> 21/05/2024	<b>Recruitment status</b> Recruiting	<input checked="" type="checkbox"/> Prospectively registered
		<input type="checkbox"/> Protocol
<b>Registration date</b> 28/05/2024	<b>Overall study status</b> Ongoing	<input type="checkbox"/> Statistical analysis plan
		<input type="checkbox"/> Results
<b>Last Edited</b> 18/02/2026	<b>Condition category</b> Nutritional, Metabolic, Endocrine	<input type="checkbox"/> Individual participant data
		<input checked="" type="checkbox"/> Record updated in last year

## Plain English summary of protocol

### Background and study aims

Many people in rural India suffer from poor nutrition because they cannot afford or otherwise do not have access to a full range of food groups. While backyard gardens could produce crops to supplement existing diets, irrigation water is often unavailable during growing seasons - a barrier that will be aggravated by climate change. This study aims to test an intervention designed to increase the consumption of a wider range of foods by promoting backyard gardens irrigated with "grey water" - relatively clean wastewater from dishwashing and bathing.

### Who can participate?

Households in 82 communities in Ganjam and Gajapati Districts of Odisha, India

### What does the study involve?

Half of the communities will be randomly assigned to receive the intervention. The intervention includes community activities designed to build awareness and capacity, as well as the provision of seeds, fencing, irrigation equipment and pest-control strategies. The intervention will be delivered by Gram Vikas, an Indian NGO. The other communities will initially serve as controls and will be offered the intervention at the end of the 12-month trial. Dietary diversity is assessed by recording the number of food groups consumed in the previous day based on a 24-hour dietary recall.

### What are the possible benefits and risks of participating?

Not provided at time of registration

### Where is the study run from?

Emory University (USA)

### When is the study starting and how long is it expected to run for?

January 2024 to December 2026

Who is funding the study?

1. CARE USA
2. Rose C. Gangarosa

Who is the main contact?

Dr Sheela Sinharoy, [Sheela.sinharoy@emory.edu](mailto:Sheela.sinharoy@emory.edu)

## Contact information

### Type(s)

Public, Scientific, Principal investigator

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## Additional identifiers

### Protocol serial number

CARE USA US3J3/ANO5US0002/8

## Study information

## Scientific Title

Climate Resilient Odisha Produce Study (CROPS): a randomized controlled trial in rural Odisha, India

## Acronym

CROPS

## Study objectives

Individuals living in households that receive the intervention will have significantly higher dietary diversity than individuals living in households that do not receive the intervention.

## Ethics approval required

Ethics approval required

## Ethics approval(s)

1. approved 15/04/2024, Emory University IRB (1599 Clifton Rd NE, Atlanta, 30322, United States of America; +1 (0)404 727 3889; irb@emory.edu), ref: STUDY00007613

2. approved 20/05/2024, Independent Ethics Committee of XIM University (Plot No.12(A), Nijigada, Kurki, Harirajpur, Puri, Odisha, 752050, India; +91 (0)674 23777000; deansgpa@xim.edu.in), ref: XU2024520212VC

## Study design

Non-blinded cluster-randomized controlled trial

## Primary study design

Interventional

## Study type(s)

Prevention

## Health condition(s) or problem(s) studied

Dietary diversity

## Interventions

Current interventions as of 06/01/2026:

Following enrollment and baselining of study participants, the 82 rural villages in Ganjam and Gajapati Districts in Odisha will be randomized using a random number generator either to the intervention arm (41 communities) or the control arm (41 communities).

Intervention arm:

1. Community meetings/trainings to:

1.1. Build knowledge, skills, and self-efficacy related to climate-smart agricultural techniques for year-round production of fruits and vegetables through backyard gardens

1.2. Improve knowledge of the importance of dietary diversity for all household members and self-efficacy related to food preparation and distribution

1.3. Increase women's negotiating and decision-making power in the household

2. Distribution of inputs and hardware including seeds and seedlings, supplies for integrated pest management (e.g., fencing material), and hardware for greywater capture and re-use (e.g., PVC pipes, watering cans)

Control arm:

No intervention (offered the intervention at the end of the trial)

The trial will be conducted from June 2024 to June 2026. The study protocol and ethics approvals authorize additional follow-up for up to 24 months following the completion of the trial to assess longer-term impacts.

Current interventions as of 12/09/2024:

Following enrollment and baselining of study participants, the 82 rural villages in Ganjam and Gajapati Districts in Odisha will be randomized using a random number generator either to the intervention arm (41 communities) or the control arm (41 communities).

Intervention arm:

1. Community meetings/trainings to:

1.1. Build knowledge, skills, and self-efficacy related to climate-smart agricultural techniques for year-round production of fruits and vegetables through backyard gardens

1.2. Improve knowledge of the importance of dietary diversity for all household members and self-efficacy related to food preparation and distribution

1.3. Increase women's negotiating and decision-making power in the household

2. Distribution of inputs and hardware including seeds and seedlings, supplies for integrated pest management (e.g., fencing material), and hardware for greywater capture and re-use (e.g., PVC pipes, watering cans)

Control arm:

No intervention (offered the intervention at the end of the 12-month trial)

The trial will continue for a period of approximately 18 months from June 2024 to December 2025. The study protocol and ethics approvals authorize additional follow-up for up to 24 months following the completion of the trial to assess longer-term impacts.

Previous interventions:

Following enrollment and baselining of study participants, the 90 rural villages in Ganjam and Gajapati Districts in Odisha will be randomized using a random number generator either to the intervention arm (45 communities) or a control arm (45 communities).

Intervention arm:

1. Community meetings/trainings to:

1.1. Build knowledge, skills, and self-efficacy related to climate-smart agricultural techniques for year-round production of fruits and vegetables through backyard gardens

1.2. Improve knowledge of the importance of dietary diversity for all household members and self-efficacy related to food preparation and distribution

1.3. Increase women's negotiating and decision-making power in the household

2. Distribution of inputs and hardware including seeds and seedlings, supplies for integrated pest management (e.g., fencing material), and hardware for greywater capture and re-use (e.g., PVC pipes, watering cans)

Control arm:

No intervention (offered the intervention at the end of the 12-month trial)

The trial will continue for a period of approximately 18 months from June 2024 to December 2025. The study protocol and ethics approvals authorize additional follow-up for up to 24 months following the completion of the trial to assess longer-term impacts.

## **Intervention Type**

Mixed

### **Primary outcome(s)**

1. Dietary diversity among adult women measured using a 24-hour dietary recall at midline, endline, and ongoing follow-up surveys

Previous primary outcome(s) as of 18/02/2026:

1. Dietary diversity among adult women measured using a 24-hour dietary recall at baseline, 6, 12, 18 and 24 months

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Previous primary outcome as of 06/01/2026:

Dietary diversity among adult women of reproductive age (18-49 years) is measured using a 24-hour dietary recall at baseline, 6 months, 12 months and 18 months

### **Key secondary outcome(s)**

1. Dietary diversity among children under age 5 and other household members measured using a 24-hour dietary recall at baseline, midline, endline, and ongoing follow-up surveys

2. Food insecurity measured using the Food Insecurity Experience Scale (FIES) at baseline, midline, endline, and ongoing follow-up surveys

3. Subjective wellbeing measured using the World Health Organization-5 (WHO-5) scale at baseline, midline, endline, and ongoing follow-up surveys

4. Self-efficacy measured using researcher-developed questions specific to self-efficacy for gardening and self-efficacy related to nutrition at baseline, midline, endline, and ongoing follow-up surveys

5. Agricultural production diversity measured using researcher-developed questions related to variety of crops grown in each season at 18 months, 24 months, and ongoing follow-up surveys

6. Household water insecurity measured using the Household Water Insecurity Experience (HSWE) scale short form at 18 months, 24 months, and ongoing follow-up surveys

7. Women's income-earning measured using a researcher-developed questionnaire about participation in work for which payment was received at 18 months, 24 months, and ongoing follow-up surveys

8. Mid-upper arm circumference (MUAC) among adult women and up to one child under age 5 per household measured using a MUAC z-score measuring tape at 18 months, 24 months, and ongoing follow-up surveys

9. Women's empowerment measured using questions adapted from the project-level Women's Empowerment in Agriculture Index at baseline, midline, endline, and ongoing follow-up surveys

Previous key secondary outcome(s) as of 18/02/2026:

1. Dietary diversity among children under age 5 and other household members measured using a 24-hour dietary recall at baseline, 6, 12, 18 and 24 months
2. Food insecurity measured using the Food Insecurity Experience Scale (FIES) at baseline, 6, 12, 18 and 24 months
3. Subjective wellbeing measured using the World Health Organization-5 (WHO-5) scale at baseline, 6, 12, 18 and 24 months
4. Self-efficacy measured using researcher-developed questions specific to self-efficacy for gardening and self-efficacy related to nutrition at baseline, 6, 12, 18 and 24 months
5. Agricultural production diversity measured using researcher-developed questions related to variety of crops grown in each season at 18 and 24 months
6. Household water insecurity measured using the Household Water Insecurity Experience (HSWE) scale short form at 18 and 24 months
7. Women's income-earning measured using a researcher-developed questionnaire about participation in work for which payment was received at 18 and 24 months
8. Mid-upper arm circumference (MUAC) among adult women and up to one child under age 5 per household measured using a MUAC z-score measuring tape at 18 and 24 months

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Previous secondary outcome measures as of 12/09/2024:

1. Dietary diversity among children under age 5 and other household members measured using a 24-hour dietary recall at baseline, 6 months, 12 months and 18 months
2. Food insecurity measured using the Food Insecurity Experience Scale (FIES) at baseline, 6 months, 12 months, and 18 months
3. Subjective wellbeing measured using the World Health Organization-5 (WHO-5) scale at baseline, 6 months, 12 months and 18 months
4. Self-efficacy measured using researcher-developed questions specific to self-efficacy for gardening and self-efficacy related to nutrition at baseline, 6 months, 12 months and 18 months
5. Women's empowerment measured using questions adapted from the project-level Women's Empowerment in Agriculture Index at baseline, 6 months, 12 months and 18 months

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Previous secondary outcome measures:

1. Dietary diversity among children under age 5 measured using a 24-hour dietary recall at baseline, 6 months, 12 months and 18 months
2. Food insecurity measured using the Food Insecurity Experience Scale (FIES) at baseline, 6 months, 12 months, and 18 months
3. Subjective wellbeing measured using the World Health Organization-5 (WHO-5) scale at baseline, 6 months, 12 months and 18 months
4. Self-efficacy measured using researcher-developed questions specific to self-efficacy for gardening and self-efficacy related to nutrition at baseline, 6 months, 12 months and 18 months
5. Women's empowerment measured using questions adapted from the project-level Women's Empowerment in Agriculture Index at baseline, 6 months, 12 months and 18 months

**Completion date**

31/12/2026

**Eligibility**

## **Key inclusion criteria**

Current key inclusion criteria as of 06/01/2026:

Intervention: Adults 18 years and older, and if applicable, their offspring aged less than 5 years, who live in the study area in Odisha, India

Evaluation: Households in 82 communities in Ganjam and Gajapati Districts of Odisha, India

Previous participant inclusion criteria as of 12/09/2024:

Intervention: Adults 18 years and older who live in the study area in Odisha, India

Evaluation: Households in 82 communities in Ganjam and Gajapati Districts of Odisha, India

Previous participant inclusion criteria:

Intervention: Adults 18 years and older who live in the study area in Odisha, India

Evaluation: Households with a child aged under 5 years (up to 25 households, one adult woman and one adult man per household) in each of the intervention and control villages

## **Participant type(s)**

Population

## **Healthy volunteers allowed**

Yes

## **Age group**

All

## **Lower age limit**

0 years

## **Upper age limit**

110 years

## **Sex**

All

## **Total final enrolment**

0

## **Key exclusion criteria**

1. Adults unable to consent
2. Individuals who do not meet age requirements
3. Prisoners
4. Cognitively impaired or individuals with Impaired Decision-Making Capacity

## **Date of first enrolment**

31/05/2024

## **Date of final enrolment**

30/06/2026

# Locations

## Countries of recruitment

India

## Study participating centre

**Gram Vikas, a Non-Governmental Organization registered in India under the Societies Registration Act 1860**

Plot No. 72/B

Forest Park, Bhubaneswar

Odisha

India

751009

## Study participating centre

**Ganjam and Gajapati Districts**

Odisha

India

N/A

# Sponsor information

## Organisation

CARE USA

## ROR

<https://ror.org/038espn32>

## Organisation

Rose C. Gangarosa

# Funder(s)

## Funder type

Charity

## Funder Name

CARE USA

**Funder Name**

Rose C. Gangarosa

## **Results and Publications**

**Individual participant data (IPD) sharing plan**

The datasets generated during and/or analysed during the current study are/will be available upon request from Dr Sheela Sinharoy, sheela.sinharoy@emory.edu.

**IPD sharing plan summary**

Available on request