Impact Assessment

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World Vegetable Center

Outline

- Why we need impact evaluation?

- How we do impact evaluation?

Why we need impact evaluation?

- Our technologies and interventions are designed to change people's lives: to raise incomes of poor people, to improve nutrition, to transfer knowledge.

Success Stories

They like it!

Lilian's children wouldn't eat the food she cooked. Now she grows vegetables that aren't bitter, changed her cooking style, and has the kids eating healthy leafy greens every day.

Children will eat vegetables if you prepare them right, says Lilian Nabangi.

"These vegetables have helped our community and our immune systems."

Lilian Nabangi

A field full of good taste and health.

Success Stories

- Can we generalize?
- Were there perhaps also any adverse effects?
- Did the costs warrant the benefits?

Impact Evaluation

- An assessment of changes in the well-being of people (targeted by our project) that can be attributed to the project intervention.

- The central question is how people's well-being would have changed if our project had not taken place, which requires the careful identification of a comparison group.

Impact Evaluation Help Us to...

- Improve our intervention designs

- Guide in strategic planning

- Quantify returns on investment

What and When to Evaluate?

- **Innovative**: Interventions that are testing a new, promising approach.

- **Replicability**: Interventions that can be scaled up or can it be applied in other countries.

- **Strategic** relevance: Interventions closely related to the Center's mission and strategic plan.

- **Lack of evidence**: Interventions for which little is known about impact, globally or locally.

- **Influential**: Impact studies with a high potential to inform a policy debate.

How do we do impact evaluation?

Impact Evaluation

- The central question is how people's well-being would have changed if our project had not taken place, which requires the careful identification of a comparison group.

What is a good comparison group?

- A. The same people before the project?

  (=comparison over time)

What is a good comparison group?

- A. The same people before the project?
    (=comparison over time)

- B. A group of people not included in the project?
    (=comparison over space)

A good comparison group must…

1. have characteristics very similar to the beneficiary group in the absence of the intervention.

2. must react to an intervention in a very similar way if it were introduced.

3. must be equally exposed to any other external drivers of change.

Two challenges to impact evaluations

- **Attribution**

  The study must correctly attribute observed changes in outcomes to the intervention.

- **Selection bias**

  Findings must be representative of the whole eligible population.

What is a good impact study?

1. Accurately describe the intervention
2. Sound understanding of the impact pathway
3. Suitable outcome indicators
4. Robust in its methods: deal with selection bias and attribution
5. Appropriately powered
6. Ideally, use quantitative and qualitative methods in combination

How we do impact evaluation?

1. Not all interventions can be evaluated quantitatively
2. Not all interventions need to be evaluated
3. Understand the 'Theory of Change' (incl. pos. neg. effects)
4. Decide on the suitable evaluation method
5. Decide on outcome indicators
6. Decide on sampling strategy
7. Write everything down in an evaluation protocol
8. Develop data collection tools
9. Apply for ethical approval (if needed)
10. Collect data
11. Analyze, document, learn

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Example 1

School gardens in Nepal

Background (1)

- Poor nutritional status of Nepalese population, particularly in rural communities; 39% of children under 5 is underweight and 49% is stunted (UNICEF 2012).

- Low consumption of fresh fruit and vegetables in combination with human disease are key problems.

- School gardens have been touted as potentially effective to address malnutrition.

- They rely on a combination of hands-on training in gardening with nutrition education to raise children's interest in eating vegetables.

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Background (2)

- Enthusiasm for school gardening in high income countries has spurred their promotion in low income countries by various organizations.

- A recent review of studies for high income countries, found healthier food preferences for 8 out of 13 studies, improvements in food knowledge and attitudes for 7 out of 10 studies, but a significant increase in children's fruit and vegetable consumption in only 2 out of 13 studies (Ohly et al., 2016).

- At the start of this project there was not a single impact study for school gardens in a low income country.

School gardens in Nepal

Study objective

To contribute robust evidence for the outcomes and impact of school gardens in low-income countries (Nepal, Bhutan, Indonesia and Burkina Faso).

Research questions

Do school gardens linked to complementary lessons and promotion:

❑ Raise children's awareness about healthier foods; increase their knowledge about sustainable agriculture, nutrition, and WASH; and strengthen their preferences for eating healthier foods?

❑ Improve the dietary behavior and nutritional status of 10- to 15-year-old school children in Nepal?

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School gardens in Nepal
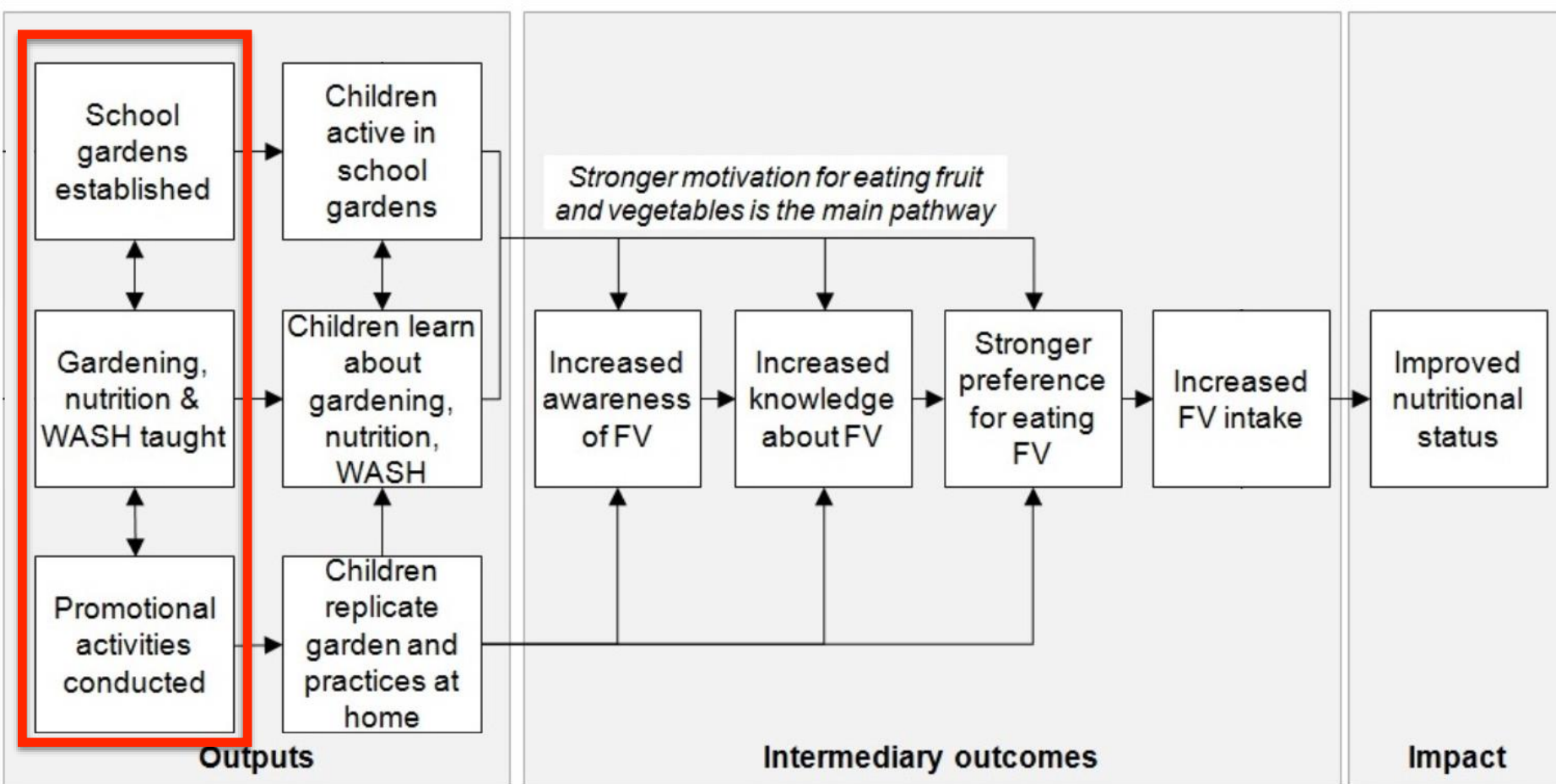
FV: Fruits and vegetables

Methods

- Designed a school garden program for Nepal as a joint project of NARC, Ministry of Education, and Ministry of Health and Population with technical support of the World Vegetable Center.

- Tested the intervention using a repeated cluster randomized controlled trial design.

- Random selection of 10 treatment and 10 control schools per year and a random sample of about 40 children per school (grades 6 and 7).

- Impact quantified using a difference-in-difference method.

School gardens in Nepal


```
                        100 eligible
                          schools
                               │
        ┌──────────────────────┼──────────────────────┐
        ▼                      ▼                       ▼
  10 schools in          10 schools in           10 schools in
      2014                   2015                    2016
        │                      │                       │
        ▼                      ▼                       ▼
  10 schools   ◄‑‑‑‑‑►   10 schools             10 schools
  429 children           423 children           423 children
                 Year 1        │                       │
               comparison      ▼                       ▼
                          10 schools   ◄‑‑‑‑‑►   10 schools
                          369 children           416 children
                                      Year 2
                                    comparison
```

Estimation method
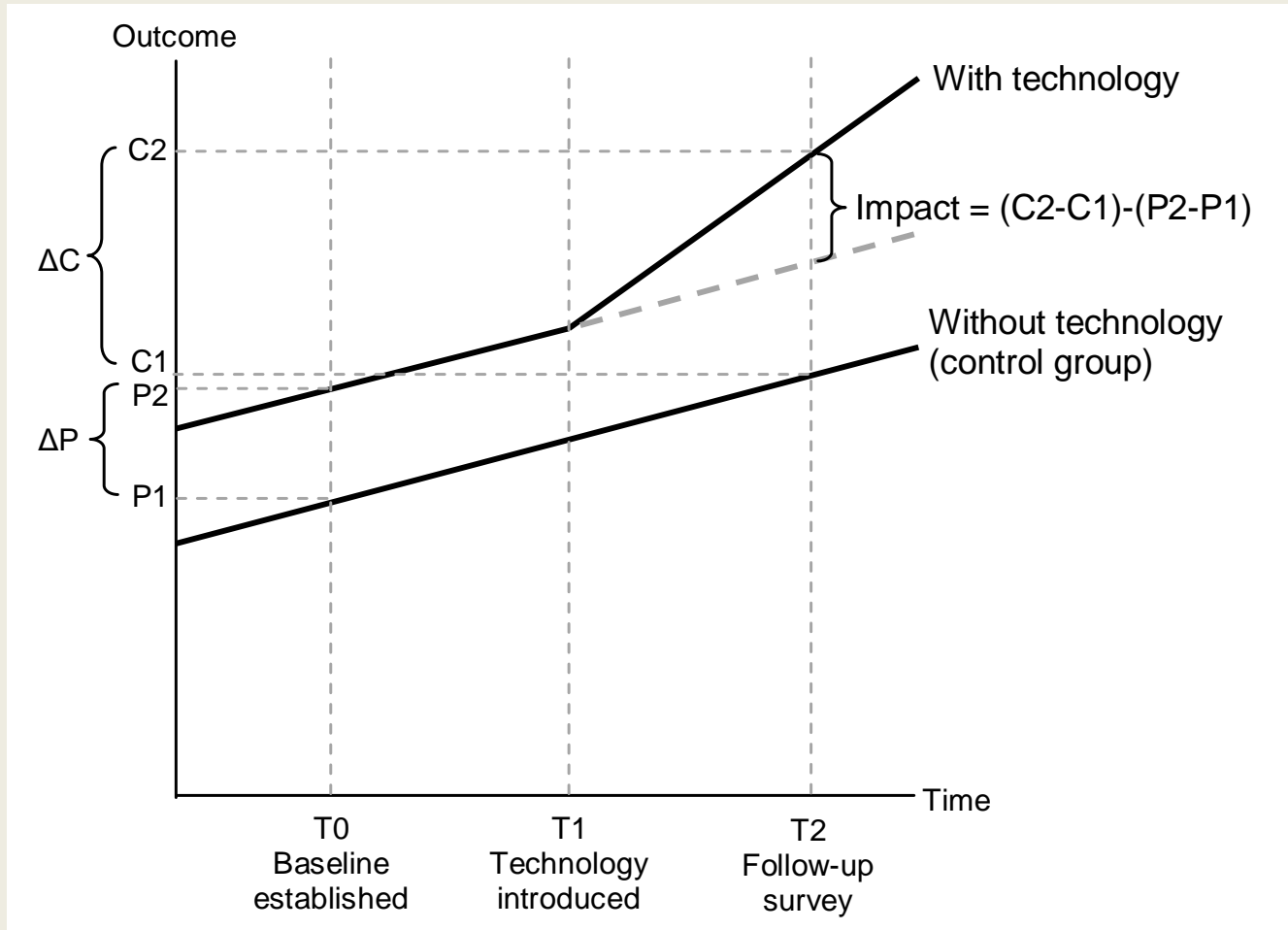
School gardens in Nepal

Outcome indicators:

1. Do school children become more aware of fruits and vegetables?

2. Do they gain more knowledge about sustainable agriculture and nutrition/WASH?

3. Do they develop healthier eating preferences?

4. Do they eat more fruit & vegetables?

5. Does their nutritional status improve?
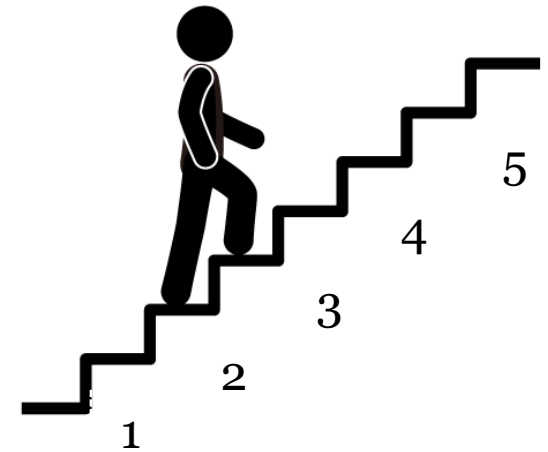
School gardens in Nepal

Data collection tools:

Day 2 — 4

What are the names of these?
(Leave blank if you can't tell or don't remember)

1 ....
2 ....
3 ....
4 ....
5 ....
6 ....
7 ....
8 ....
9 ....
10 ....
11 ....
12 ....
13 ....
14 ....
15 ....
16 ....
17 ....
18 ....
19 ....
20 ....

Day 3 — 6

Do you agree with the following sentences?
(Cross only one per row ☒)

Statement	AGREE	DON'T AGREE
1. Eating meat helps to build muscles.	☐	☐
2. Drinking milk gives you strong teeth.	☐	☐
3. Rice contains more vitamins than fruits.	☐	☐
4. Bread is a good source of proteins.	☐	☐
5. Eating lemons and oranges helps to protect against disease.	☐	☐
6. Eating dark green leafy vegetables is more healthy than light-green ones.	☐	☐
7. Vegetables help to protect against infections.	☐	☐
8. You should not drink more than six glasses of water a day.	☐	☐
9. Breakfast is the most important meal of the day.	☐	☐
10. Vegetables that taste bitter are dangerous to eat	☐	☐

Day 5 — 9

Which of these vegetables and fruits do you like to eat? (Cross only one per row ☒)

	I don't know it	I do not like to eat it	I like to eat it	I like to eat it a lot
1	☐	☐	☐	☐
2	☐	☐	☐	☐
3	☐	☐	☐	☐
4	☐	☐	☐	☐
5	☐	☐	☐	☐
6	☐	☐	☐	☐
7	☐	☐	☐	☐
8	☐	☐	☐	☐
9	☐	☐	☐	☐
10	☐	☐	☐	☐
11	☐	☐	☐	☐
12	☐	☐	☐	☐

Dolakha & Ramechap districts
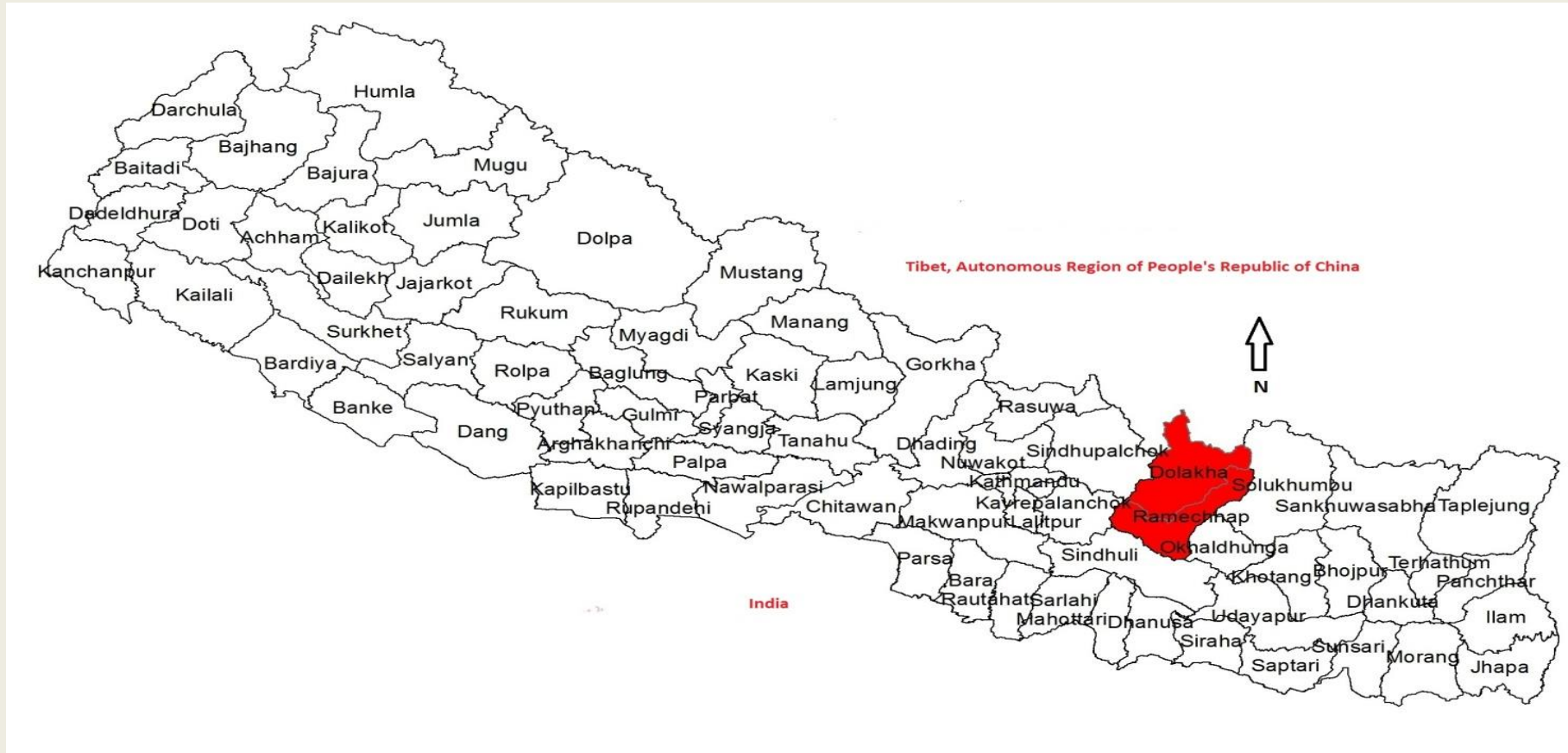
1. Planning phase

1. One-day Inception Workshop on Vegetable Go to School project was held on 31 March, 2014 at Khumaltar

2. "Curriculum and Student Action Plan" was prepared in Nepali and published

3. Orientation was given to the teachers on how to implement garden activities and the 23 week action plan.

Proposed crop calendar

Plot no.	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	May
1	-	Radish (*40 days*)		Fenugreek (*Local Variety*)		Brinjal (*Pusa Purple Long*)			
2	-	Broad Leaf Mustard (*Kumal Red*)				Tomato (*Sirjana*)			
3	-	Spinach (*Local Variety*)				Pumpkin/Squash (*Local Variety*)			
4	-	Cauliflower (*Kumal Jyapu*)				Yard Long Bean (*Kumal Thane*)			
5	-	Turnip(*Kathmandu Red*)				Capsicum (*California Wonder*)			
6	-	Fenugreek (*Local Variety*)		Coriander (*Local Variety*)		Swiss Chard (Susag)			
7	-	Broccoli (*Green Sprout*)				Okra (*Parbhani Kranti*)			
8	-	Carrot (*Nantes*)				Vegetable Soybean (*Local Variety*)			
9	-	Garden Peas (*Arkale*)				Bitter gourd (*Green Karela*)			
10	**POLYHOUSE (NURSERY)**								

2. Implementation phase

1. Support given to set up the school garden
2. Activities implemented according to the action plan
3. Book and seeds and money for basic inputs provided
4. Regular follow-up conducted

Garden implementation

Before   During   After

Garden implementation

Before

During

After
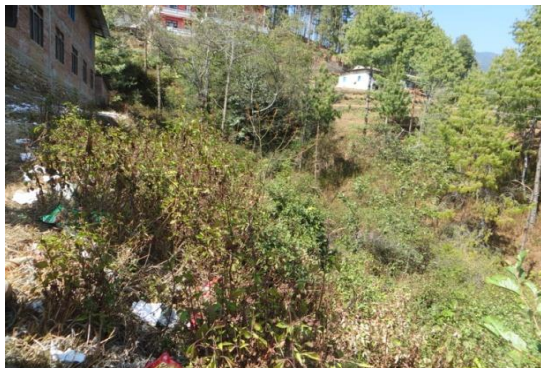
3. Promotional activities

- Parents/community invited
- Harvesting event
- Harvested vegetables distributed for home consumption (no school meal program)
- Promotional activities (e.g. pencil bags, posters, competitions)
- Earthquake relief
- Study tour for the focal/head teachers (12-16 March, 2016)
- Certificated & prizes

School garden production

Table 1: Average vegetable production per school per year (85 m² land per planting bed), 2014-15.

Bed	Winter season	kg	Summer season	kg
1	Radish	7.8	Brinjal	7.1
2	Broad leaf mustard	4.2	Tomato	19.6
3	Spinach	2.5	Squash	20.5
4	Cauliflower	9.6	Yard long bean	6.7
5	Turnip	6.5	Capsicum	10.2
6	Broccoli	5.8	Swiss chard	2.5
7	Carrot	4.0	Okra	15.2
8	Fenugreek	1.5	Vegetable soybean	5.0
9	Peas	5.2	Bitter gourd	12.8
Total		47.1		99.6

Sample characteristics

Characteristic	Control (n=416)	Treat. (n=369)	Sign.
Age (years)	12.5	12.6	
Female (%)	59.4	53.9	
Parents are farmers (%)	83.2	87.8	
Stunted (%)	41.4	47.4	*
Wasted (%)	9.9	8.7	

Significance levels: ***p<0.01, **p<0.05, * p<0.10.
Note: year 2 comparison only.

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Evidence for impact

Outcome indicator	Year 1 (n=2,550)		Year 2 (n=1,570)	
	Impact	Sign.	Impact	Sign.
Awareness (%)	29.4	***	12.8	***
Agricultural knowledge (%)	21.7	***	16.7	***
Nutrition/WASH know. (%)	13.8	***	14.6	***
Preferences (%)	15.8	***	19.1	***
Vegetable consumption (%)	2.35		0.91	
Fruit consumption (%)	-0.75		7.11	
Nutritional status (HAZ)	0.01		-0.04	

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Cost of establishing the garden

Item	Description	NRs	USD
Labor	Land preparation	10,000	100
	Fencing	7,500	75
	Polyhouse construction	1,500	15
	Skilled labor	5,000	50
	Preparation of garden plots	6,000	60
Bamboo/plastic	Fencing	4,500	45
	Polyhouse construction	3,000	30
	Plastic for tunnel (85 gauge)	6,000	60
			100
Equipment	Kodalo, Kuto, watering can, khukuri, etc.	10,000	
	Water tank	10,000	100
	Pipe	12,000	120
Inputs	Manure (FYM)	7,500	75
	Seed	7,000	70
Maintenance		5,000	50
Total		**9,5000**	**950**

School gardens in Nepal

Achieved:
Improved awareness, knowledge, preferences for vegetables and fruits
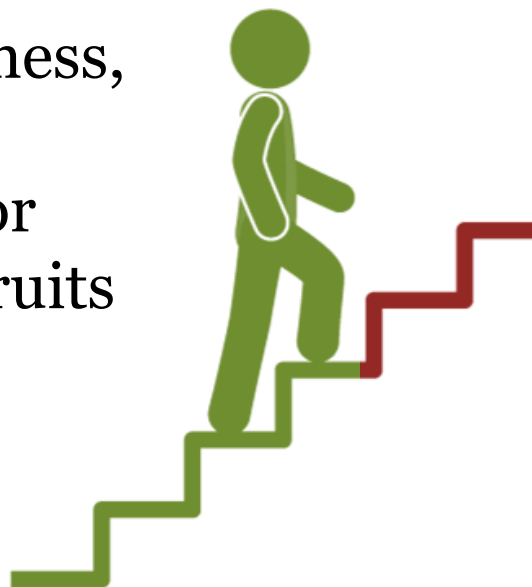
Not yet achieved:
Increased consumption of fruit and vegetables

Example 2

Training farmers in off-season vegetable production Bangladesh

Off-season vegetable production

- Intervention included:
  - Seed of heat tolerant varieties (BARI Hybrid 4), low-cost rain shelters, hormone sprays
  - Training in the use of raised planting beds and integrated crop management
  - Weekly follow-up to provide technical advice

Off-season vegetable production

- Objective: Effect of training in off-season tom. prod. on farm output, profit, income, pesticide use
- 104 trainees in 2012, which gave a sample of 94
- Selection bias because of purposive selection of trainees
  - Selected control group using the same criteria
  - Used statistical matching methods (IPW, PSM) to reduce bias
- Data collected in November 2013 from 245 hh
- Reference period May-Nov.2013

Off-season vegetable production

Hh Characteristic	Trained (n=94)	Non-trained (n=151)	
Household size (persons)	5.06	4.83	ns
Working age males (persons)	1.89	1.75	*
Dependents (persons)	1.79	1.76	ns
Land owned (ha)	0.48	0.48	ns
Vegetable growing experience (years)	11.61	10.69	ns
Age (years)	41.45	45.64	***
Education (years)	7.60	5.70	***
Main occupation is farming (%)1	0.78	0.90	***
Member of farmers' organization (%)1	0.61	0.29	***

*, **, and *** denote significance of mean difference at the 10%, 5%, and 1% level, respectively.
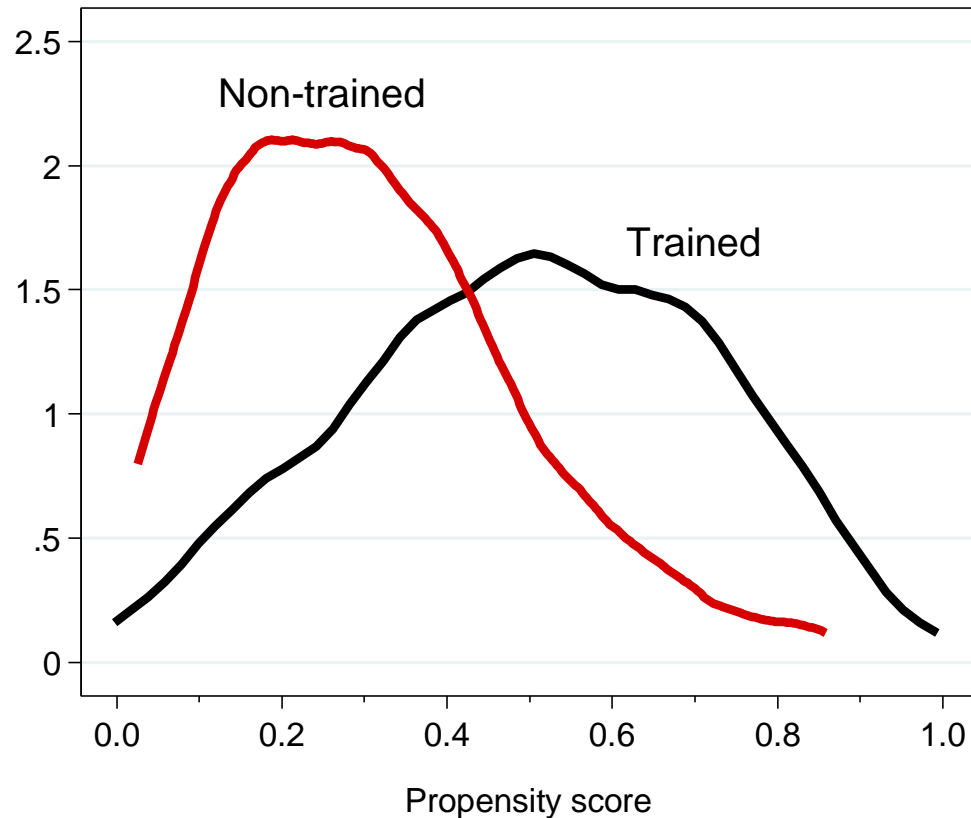
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Off-season vegetable production

Statistical matching

- Regress (trained/non-trained) on the hh and personal characteristics

- Estimate predicted values (propensity score)

Off-season vegetable production

kernel = epanechnikov, bandwidth = 0.0765

Off-season vegetable production

Outcome indicator	Average treatment effect	% change
Farm profitability (USD/farm)	290.2**	49.9
Total income (USD/capita)	85.9**	50.5
Pesticide use (kg/ha)	2.0**	58.4

*, **, and *** denote significance of mean difference at the 10%, 5%, and 1% level, respectively.

Conclusion

Now you know more!

- … about the work of the World Vegetable Center
- … about the importance an organization like ours attaches to impact evaluation
- … about the type of studies we typically conduct

We like to work together with you!

References

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