School gardens and healthy eating in low-income countries: what does the evidence show?



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Webinar "Home Gardens for Resilience and Recovery", 3 November 2020



worldveg.org



Outline in 4 parts

- 1. Children's diets
- 2. How can school gardens help?
- 3. What is the evidence that they work?
- 4. Innovative school garden pilot in Nepal

1. Children's diets

Jharkand, India, 2012

Sindhupalchok, Nepal, 2018



Sindhupalchok, Nepal, 2018

2. School gardens

Indonesia, 2015



Knowledge of healthy food (production and eating)

Stronger liking/preference for fruit and vegetables

Increased intake of fruit and vegetables

School gardens

School gardens can also have other objectives:

- Greening of schoolyards
- Environmental awareness
- Biodiversity conservation
- Science learning
- Sustainable agriculture
- Social learning

See also: Hunter, D., Monville-Oro, E., Burgos, B., Roel, C.N., Calub, B.M., Gonsalves, J., Lauridsen, N., 2020. Agrobiodiversity, School Gardens and Healthy Diets: Promoting Biodiversity, Food and Sustainable Nutrition. Routledge, London (UK).

Approach of World Vegetable Center:

- 1. Work with national partners incl. education dept.
- 2. Develop training curriculum; age 8-12 yrs old
- 3. Select suitable schools, identify focal points
- 4. Train focal points
- 5. Provide cash installments/inputs
- 6. Help with garden setup
- 7. Follow-up
- 8. Monitor & evaluate



Sindhupalchok, Nepal, 2018

Sindhupalchok, Nepal, 2018



Central Java, Indonesia, 2015

Sindhupalchok, Nepal, 2018

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Because of these challenges, the main purpose is usually not to produce a lot of vegetables, but rather as an education tool.

A school garden is not a farm!

Sindhupalchok, Nepal, 2018

Interference examinent

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Central Java, Indonesia, 2015

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VEGETABLES GO TO SCHOOL "Sayuran Masuk Sekolah"

AVRDC The World Vegetable Center

Central Java, Indonesia, 2015

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• Blair (2009) reviewed 12 quantitative studies in the United States. She found positive outcomes in the area of science achievement (knowledge) for 9 schools but <u>increased fruit and vegetable</u> <u>consumption for only 1 school</u>.



• Ohly et al. (2016) reviewed studies for Australia, USA and Europe found significant effects on healthier food preferences in 8 out of 13 studies, improvements in food knowledge and attitudes in 7 out of 10 studies, and a <u>significant increase in</u> children's fruit and vegetable consumption in 2 of the 13 studies.



SDC-funded **Vegetables Go to School** project (2014-2017) established school gardens in Bhutan, Nepal, Indonesia, the Philippines, and Burkina Faso.



Schweizerische Eidgenossenschaft Confédération suisse Confederazione Svizzera Confederaziun svizra

Swiss Agency for Development and Cooperation SDC



Swiss Tropical and Public Health Institute Schweizerisches Tropen- und Public Health-Institut Institut Tropical et de Santé Publique Suisse

Swiss TP

Associated Institute of the University of Basel



Table 1. Data collected for the study.

	Bhutan			Nepal			Burkina Faso		
	С	Т	А	 С	Т	А	 С	Т	Α
Year-1:									
# schools	-	-	-	20	10	30	10	10	20
# students, baseline	-	-	-	904	466	1,370	500	500	1,000
# students, endline	-	-	-	882	454	1,336	499	501	1,000
# students, total ¹	-	-	-	846	429	1,275	491	488	979
Year-2:									
# schools	9	9	18	10	10	20	10	10	20
# students, baseline	265	260	525	433	394	827	400	400	800
# students, endline	258	259	517	385	428	813	400	400	800
# students, total ¹	235	233	468	416	369	785	389	392	781

Notes: C=Control; T=Treatment; A=Sum of Control and Treatment. ¹ Students outside an age range were dropped from the sample with the age range being 9-15 years old for Bhutan, 10-15 years for Nepal, and 8-14 years old for Burkina Faso. *Source*: (Schreinemachers *et al.*, 2017a; Schreinemachers *et al.*, Accepted; Schreinemachers *et al.*, 2017b)

	Bhutan	Nepal		Burkina Faso		
Outcome variable	Year-2	Year-1	Year-2	Year-1	Year-2	
Awareness:						
% of fruit and vegetables	17.9	29.4	12.8	3.3	2.5	
correctly named	***	***	***			
Knowledge:						
% of correct answers on	15.2	21.7	16.7	4.5	5.7	
sustainable agriculture	**	***	***			
% of correct answers on food,	-5.2	13.8	14.6	6.1	7.7	
nutrition & WASH		***	***	**	**	
Preferences:						
% of fruit and vegetables liked	9.5	15.8	19.1	-1.4	12.3	
	**	***	***			
Behavior:						
% of children that ate vegetables	11.7	2.35	0.91	20.2	2.7	
	**			*		
% of children that ate fruit	-3.6	-0.75	7.11	-6.5	-3.9	
# of different vegetables eaten	0.19	0.09	-0.04	0.3	0.2	
# of different fruits eaten	-0.09	0.07	0.08	NA	0.1	
Students (n)	468	1,275	785	979	781	

Table 2. Impact of the school garden intervention on nutrition outcomes in Bhutan, Nepal and Burkina Faso, average treatment effects showing marginal effects at means.

Notes: ***p<0.01, **p<0.05, * p<0.10. NA=Not available (the average treatment effect could not be estimated as the number of different fruits eaten in the sample of students in Burkina Faso in year-1 was near zero). Source: (Schreinemachers *et al.*, 2017a; Schreinemachers *et al.*, Accepted; Schreinemachers *et al.*, 2017b).



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Lack of impact may be explained by:

- Low availability of healthier foods in children's homes
- A lack of behavioral change among parents



4. Pilot in Nepal



Children Parents

School gardens + nutrition education Home gardens + nutrition education

School Vegetable Garden for Nutrition Education

World Veg

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School gardens

1. 23-week curriculum 2. Target age 8-12 yrs **Trained focal teachers** 3. \$880 in 3 installments 4. Seeds for winter and 5. summer season 6. Regular follow-up and support





Home gardens

1. 3 training events on gardening and nutrition 2. Seeds for winter and summer season 3. EM fertilizer, biopesticide 4. Follow-up by school teachers



Randomizedcontrolled trial

52 eligible schools

Treatment 15 schools 450 children + parents **Control** 15 schools 450 children + parents Une



Parents

- 1. +26% food and nutritional knowledge (p<0.001)
- 2. +5% agricultural knowledge (p=0.022)
- 3. +10.2% liking for vegetables (p<0.001)
- 4. +15.4 more speciesharvested from the garden

Children

- No effect on food and nutritional knowledge (p=0.667)
- 2. No effect on agricultural knowledge (p=0.119)
- 3. +6.1% liking for vegetables (p=0.070)
- 4. +8.1% healthy snack preferences (p=0.042)

Effects on food choice



Period	Control (mean)	Treatment (mean)	Impact (ATE)	p-value	% change
Baseline (June)*	0.32	0.29			
Jul-Sep (Q1)*	0.26	0.24	0.01	0.620	4.0%
Oct-Dec (Q2)	0.26	0.27	0.04	0.084	15.1%
Jan-Mar (Q3)	0.25	0.29	0.07	0.017	25.9%
Apr-Jun (Q4)	0.22	0.25	0.06	0.088	25.5%

* Before start of the intervention

5. Conclusion

Sindhupalchok, Nepal, 2018

Recap

- 1. Problem with unhealthy food choices among children and adults
- 2. School garden have much potential to promote healthier food choices
- 3. However, evidence for behavioral change is limited
- 4. Low availability + parental food choices
- 5. These can be addressed through a home garden intervention

Conclusion



 School gardens in low-income countries need to influence children's food preferences and food behavior, but also make healthy food more available in children's homes and also nudge parents toward healthier food choices.





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Drivers of Food Choice

Competitive Grants Program



Arnold School of Public Health

Funders



BILL& MELINDA GATES foundation

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