Socio-economic effects of PW on watershed rehabilitation and irrigation interventions in BHA-supported PSNP areas of Ethiopia

[[Household food security, Nutrition, Resilience, Institutional capacity & sustainability]]

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BACKGROUND

❑ **PSNP's Aim**: (1) Improve food & nutrition security (short-term); and (2) Protect/build/develop assets for sustaining stable access to food (long-term).

❑ **Program Target (PSNP4)**: Chronically food-insecure households in areas of high food insecurity.

❑ **Study Focus & Geography**: Understand the effects of the BHA investments (2017 to 2021) in watershed rehabilitation and SSI interventions in the Tigray, Oromia, and Amhara regions.

❑ **Scope of Assessment**: Changes in Biophyiscal indicators (vegetation, water, sustainability) and in socio-economic indicators (food security, nutrition, resilience, institutional Capacity)

STUDY WATERSHEDS
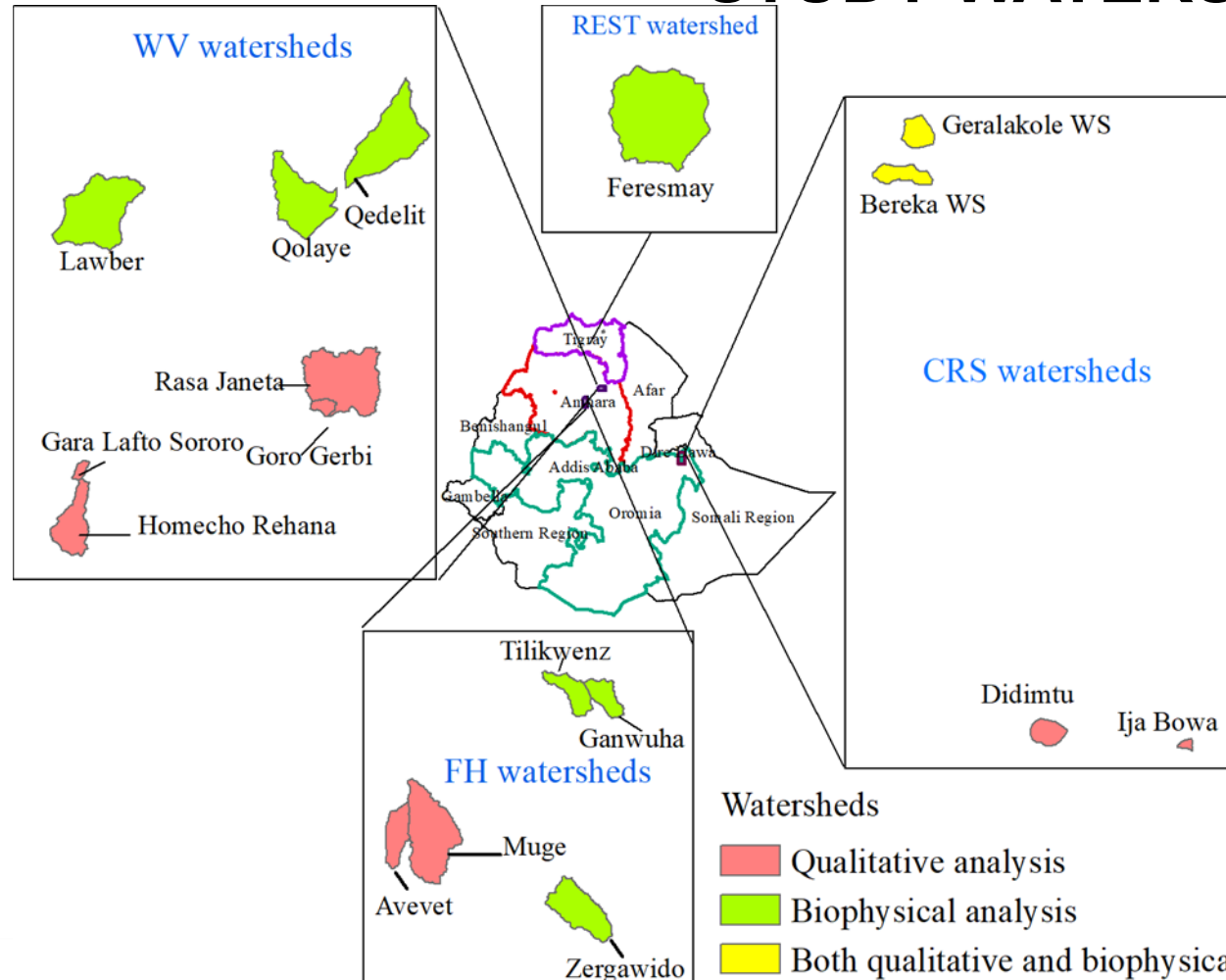
S. No.	Watersheds	Area (ha)	Type of Interventions
I	**Relief Society of Tigray (REST)**		
1	Feresmay	7662	14
II	**Catholic Relief Services (CRS)**		
1	Bereka	484	6
2	Garalakole	440	4
3	Didimtu	406	6
4	Ija Bowa	65	5
II	**World Vision (WV)**		
1	Laweber	1051	10
2	Qolaye	770	9
3	Qedelit	940	11
4	Rasa Janeta	67764	
5	Goro Gerbi	4853	
6	Garalafto Sororo	3168	
7	Homecho Rehana	27735	
IV	**Food for the Hungry (FH)**		
1	Zergawido	4843	14
2	Ganwuha	1900	12
3	Tilikwenz	2265	8
4	Muge	8497	
5	Avevet	2664	

Methodology – Data (1)

❏ **Key informant Interviews (KIIs)**

    ❏ 16 with national stakeholders

    ❏ 10 group interview with local implementors and gov't staffs

❏ **Focus Group Discussions (FGDs)**

    ▪ 19 with PSNP beneficiaries

    ▪ 1 with non- beneficiaries

❏ **PSNP4 data collected in 2016, 2018 and 2021**

Methodology – Indicators & Models (2)

- **Food (in)security indicator(s):** *food gaps* **-** the number of months (in the last 12 months) that households had trouble meeting their food needs. The food gap values range from 0 to 12, with zero indicating that households are fully food secure and 12 suggesting the worst food insecurity scenario.

  MODEL: We employ a panel **Poisson regression model** (count data model).

- **Nutrition indicator (s):** *daily per capita calorie intake* of the household and the impact of the intervention is estimated using a random effect panel regression model.

  MODEL: We use a **random effect panel** to understand the nutritional outcome of PSNP interventions.

Resilience

- Several household and individual level observable variables were used to construct the five key resilience indicators.

- Multiple Indicators and Multiple Outcomes model **(MIMIC) in a framework of structural equations** is used to estimate resilience capacity of the household.

- Each pillar is individually estimated using factor analysis of the variables that make up the dimension and constructed the resilience index.

Resilience Pillars	Indicator variables
Food security (FS)	-Monthly per capita food expenditure
	-No of months a household suffered from food shortages (food gap)
Access to Basic services (ABS)	=1 if there is access to electricity
	=1 if there is access to pied public water
	=1 if there is access to daily market
	=1 if there is access to primary school
	=1 if there is cellphone coverage
	=1 if there is access to roads in rainy times
Asset (A)	-Land size (ha) (per capita)
	-TLU (Per capita)
	-radio/tv ownership
	-table/chair ownership
Social Safety Nets (SSN)	-Total amount in birr for all in kind payments (log)
	-Total cash payment in birr (log)
	-Remittance from relatives (log)
	-Loan transfer (log)
Adaptive Capacity (AC)	=1 if household head has formal education (literate)
	Dependency ratio (inverse)
	No of crop produced
	=1 if household member is engaged in off-farm wage work or casual/irregular wage

Food (in)security
Overall, households in BHA woredas are found to have a smaller food gap that signifies better food security status.

VARIABLES	Coef.	Se.
BHA woreda (1=yes)	-0.17***	0.02
Public work SWC (1=participate)	0.11***	0.02
Water harvesting PW (1=practice)	-0.08**	0.03
Year (2018)	-0.33***	0.02
Year (2021)	0.06***	0.02
Plot irrigation (1=irrigator)	-0.05*	0.03
No of crops produced	-0.08***	0.01
Age of the head of the household	-0.00***	0.00
Sex (1=female)	0.06***	0.02
Family size	0.06***	0.00
Literacy (1=read& write)	-0.05***	0.02
TLU	-0.05***	0.00
Credit for productive purpose	-0.03	0.03
Cultivates land size (ha)	-0.13***	0.01
Constant	1.05***	0.03
Observations	12,201	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Nutrition

- Nutritional outcome of households in BHA woredas is not statistically different from non-BHA households.

- FGD and KIIs participants reported positive nutrition outcomes when irrigation development was combined with watershed development at Simada, Kurfa Chele, and Gemechis sites

VARIABLES	Nutrition calorie intake	se
BHA Woreda (1=yes)	60.26	151.04
Public work SWC (1=participate)	-95.60	66.58
Water harvesting PW (1=practice)	105.88	77.47
Year (2018)	-345.80***	103.48
Year (2021)	-84.95	141.82
Plot irrigation (1=irrigator)	108.69	95.20
No of crops produced	46.28**	20.48
Age of the head of the household	6.05***	2.08
Sex (1=female)	401.11***	69.67
Family size	-255.35***	15.13
Literacy (1=read& write)	129.95**	61.21
Remittance	0.07**	0.04
TLU	47.62***	10.17
Credit for productive purpose	159.72	102.94
Cultivates land size (ha)	224.38***	80.98
Constant	2,991.58***	103.00
Observations	11,203	

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Resilience

- Generally, the results suggest that BHA woredas are more resilient than non-BHA woredas.

- The watershed rehabilitation practices show no significant impact on the resilience capacity of households.

- Households that practice irrigation on their plot are much more resilient to shocks than their counterparts.

Variables	Coeff	Se
BHA woreda (1=yes)	0.01***	0.00
Water harvesting PW (1=practice)	0.00	0.00
Public work SWC (1=participate)	0.00	0.00
Plot irrigation (1=irrigator)	0.01***	0.00
Improved seed (1= user)	0.01**	0.00
Chemical fertilizer (1=user)	0.03***	0.00
Pesticide (1=user)	0.01***	0.00
Extension (1=received any advice)	0.02***	0.00
Village saving and lending association (1=member)	-0.00	0.00
Micro finance (1=member)	0.01***	0.00
Bank (1=have account)	0.02***	0.00
Year (2018)	0.03***	0.00
Year (2021)	0.01***	0.00
Sex (1=female)	0.04***	0.00
Dependency ratio	-0.02***	0.00
Literacy (1=read& write)	0.01**	0.00
Faced drought shock (1=yes)	0.00	0.00
Faced flooding shock (1=yes)	-0.01**	0.00
Constant	-0.23***	0.00
Observations	11,581	

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Conclusion/recommendations

❑ Households in intervention areas reported reduced food gaps, and thus improved food security and resilience compared to areas without BHA support; but we do not find evidence on households' nutritional impacts of the interventions studied.

❑ Land-scarce areas - intensification approaches are particularly needed.

❑ Increased emphasis is needed regarding the functionality and maintenance of constructed irrigation and watershed infrastructure, as the current focus is primarily on construction

❑ Monitoring and evaluation approaches should be strengthened to help realize positive outcomes from the interventions; priority needs to be given to revising indicators and georeferencing rehabilitated watersheds and irrigation works

❑ Introduce periodic and targeted capacity-building for user associations, community leaders, community facilitators, and other entities that can strengthen the sustainability of investments