

# Agricultural Technologies and Women's Empowerment in Rural Ethiopia: Do Improved Agricultural Technologies Matter?



**By  
Tsegaye Mulugeta**



**UNU\_WIDER 2020: Evidence to enhance  
inclusive growth**

# Introduction and Summary ...

## Roles of Women in agriculture :

- produce over 50% of the world's food (FAO, 2011a)
- Produce 60-80% of the food in developing countries (FAO)
- comprise about 43% of the agricultural labor force, (Doss, 2014)

- ✓ Women are also more likely than men to spend income in family's well-being
- ✓ So, women's empowerment enhances their ability to attain instrumental outcomes, such as improvements in their and their children's health , education and nutrition

But, compared to men –

- ✓ Women have less access to **resources, opportunities, community participation**, etc.
- ✓ women receive less than **10% of the credit** and only **1% of total credit to agriculture**
- ✓ Worldwide, women receive **only 5% of extension Services** delivered; **1% in SSA**; and have
  - **Limited Access to land and tenure security**
  - **Low access to technologies and greater time constraints**
  - **Less Mobility than men and less Education and training**
  - **Limited access to finance**

# Why do we worry more about women?

“Where women are an important part of agricultural production, but failure to release their full potential is a contributing factor to slow growth, poverty and food insecurity.”

- *Agriculture for Development* – 2008 World Development Report (Adapted)

## Rational and Motivation of the study

**In the past few decades ,**

- ✓ there exists a growing interest in the agricultural sector as an engine of growth and development, and parallelly recognition to the importance of women in agricultural sector
- ✓ The **complex** and **multidimensional** nature of empowerment makes its measurement more difficult, especially in agriculture
- ✓ In order to design effective gender intervention frameworks, it is also important to recognize the **context and domain specific heterogeneity** in empowerment indicators.
- ✓ But no study has been conducted that link women’s empowerment to agriculture in program evaluation

## Objective(s):

Identify the impact of improved agricultural technology adoption on women empowerment in rural Ethiopia.

**Q#1:** does technology adoption affect women empowerment ?

**Q#2:** which indicators and dimensions are most affected by adoption?

**Q#3 :** does technology adoption leads to reduction in empowerment gap?

In this study agricultural technology refers to joint application of recommended amount of chemical fertilizer with extension service.

## Methodology

✓ differences-in-differences (DID) and PSM methods are used

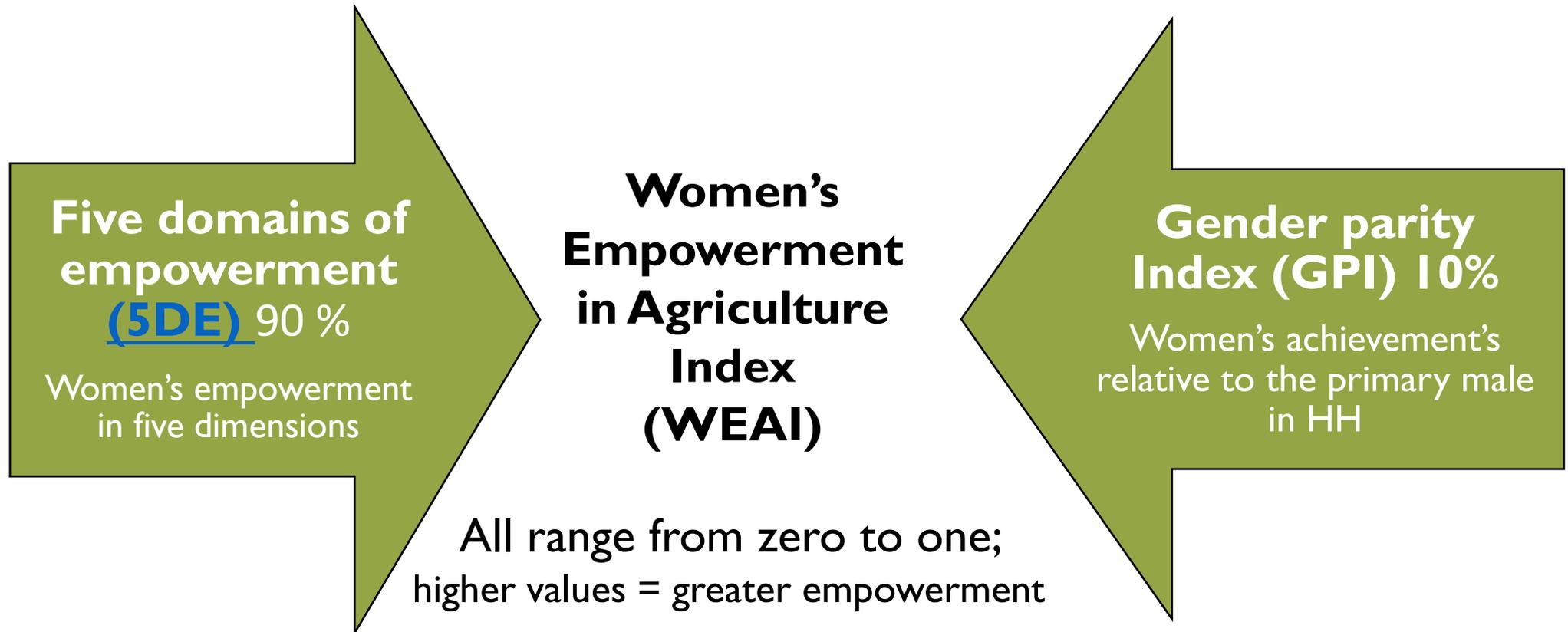


# Methodology, cont'd

## Measuring Women's Empowerment

The first comprehensive and standardized measure to directly capture women's empowerment in agriculture is the Women's Empowerment in Agriculture Index (WEAI) developed by USAID, OPHI, IFPRI.

WEAI is made up of two sub indices



# Model Specification

$$(1) \quad y_{it} = \alpha_i + \varepsilon_t + \theta T_{it} + \beta X_{it} + \mu_{it}$$

The DID model with a two-way fixed effect is given by:

- $y_{it}$  is the outcome variable (5DE and Emp't Gap, EG)
- $T$  = treatment indicator
- $X_{it}$  is a vector of household characteristic
- $\alpha_i$  are individual fixed effects
- $\varepsilon_t$  are the year or wave fixed effects and
- $\mu_{it}$  is the random error term.
- $\theta$  is the DID parameter, ATT on empowerment indicators

# Findings

## I. Descriptive Results

women's empowerment is almost similar to that of men's in general

### Empowerment

14.92 % of the adopter women

7.67 % of the non-adopter women

9.68 % of all the men

13.96% of all the adopters

8.43 % of the non-adopters

### Adequacy

adopters have achieved 47.72 % adequacy scores in the 6 indicators,

non-adopters achieve only in 44.66 % of them.

Adopter women have achieved in 48.42%

Non-adopter women have achieved in 44.27%

# Findings, Cont'd

Another comparison was women's by women's status of technology adoption decision

## Women enjoy parity

- about 67.42 % of adopters and
- 57.31 % non-adopters enjoy parity

## Enjoy both empowerment and gender parity

- about 14.51 % adopter women
- and 7 % non-adopter women

More women were found under the category in which parity is enjoyed, but with no empowerment in the 5DE

enjoyed gender parity ,BUT disempowered.

52.95 % adopters

50.31 % non-adopters

Lack BOTH

32.12 % adopters

42.02 % non-adopters

Next, we computed the sample A-WEAI :

$$\text{A-WEAI} = 0.500, (0.9 \times 5DE + 0.1 \times \text{GPI})$$

5DE was 0.46

GPI score for the sample was 0.91.

In general, parity is enjoyed by about 58.80% of the women

## Findings, Cont'd

### disempowerment by domain,

- control over use of income leads
- followed by decisions on resource
- women are less disempowered in time domain

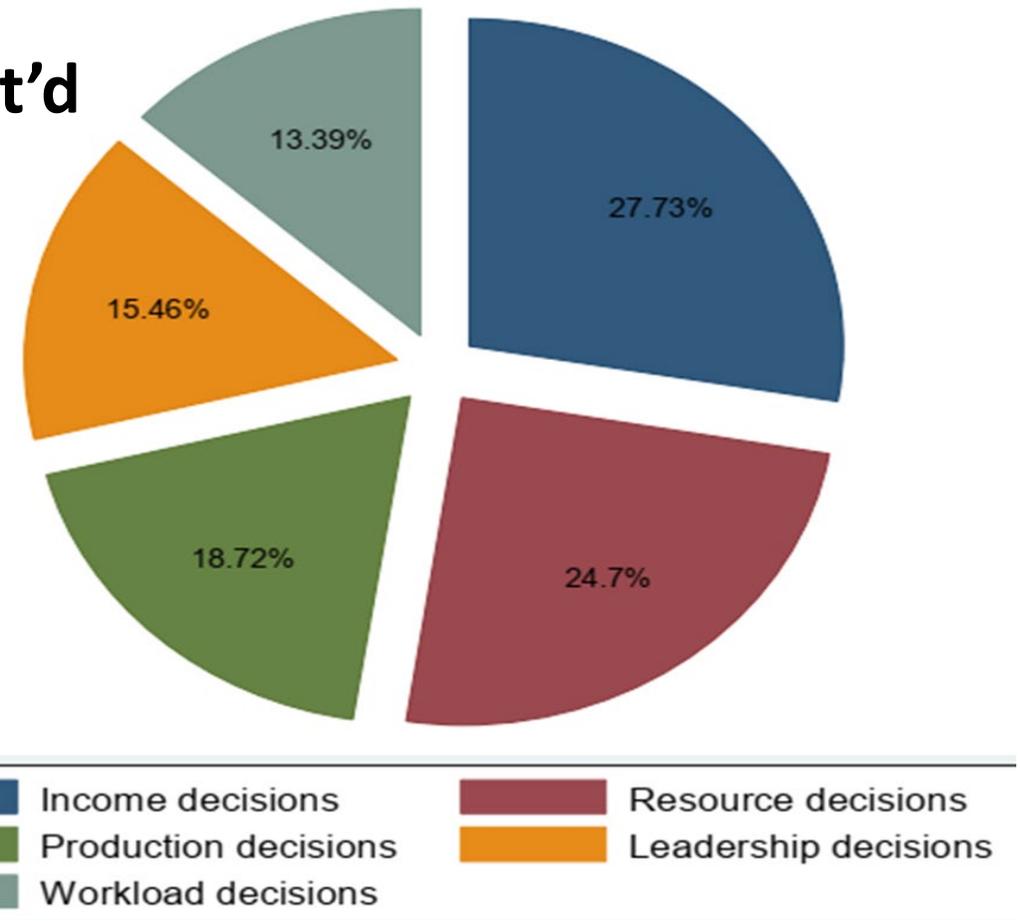


Figure 5: Contribution of each of the five domains to disempowerment

## Econometrics Results

- PSM results indicate for the whole sample indicate that adoption had a positive and significant effect on 5DE.
- The estimated impact ranges from 4.3 to 6.1 %

# Findings, Cont'd

✓ Impact of technology adoption on 5DE (Pooled sample)

✓ Impact of technology adoption on 5DE by Sex

Table 6: Impact of technology adoption on 5DE (Pooled sample)

Matching Type	Outcome mean		ATT
	Adopters	Non-adopters	
NNMa <sup>34</sup>	0.480	0.428	0.052(5.97) ***
NNMb <sup>35</sup>	0.480	0.431	0.048(4.60) ***
RM	0.480	0.418	0.061(5.83) ***
KMa <sup>36</sup>	0.480	0.432	0.047(5.79) ***
KMb <sup>37</sup>	0.480	0.436	0.043(5.34) ***
SM <sup>38</sup>	0.480	0.424	0.056(11.47) ***

Table 7: Impact of technology adoption on 5DE by Sex

Matching Type	Outcome mean and ATT					
	Female			Male		
	Adopters	Non-adopters	ATT	Adopters	Non-adopters	ATT
NNMa	0.487	0.425	0.062(5.05) ***	0.472	0.431	0.041(3.34) ***
NNMb	0.487	0.405	0.082(5.55) ***	0.472	0.433	0.039(2.59) **
RM	0.488	0.405	0.083(5.67) ***	0.478	0.440	0.038(2.48) **
KMa	0.487	0.431	0.056(4.90) ***	0.472	0.443	0.029(2.55) **
KMb	0.487	0.427	0.060(5.51) ***	0.472	0.438	0.034(2.95) ***
SM	0.487	0.425	0.062(7.36) ***	0.472	0.422	0.049(6.53) ***

# Findings, Cont'd

## PSM Results

- Domain-wise *time use* contributes most to women's empowerment (*supporting the descriptive results*).
- The estimated impact ranges from 3.2 to 4.2 % increase in empowerment score measured by 5DE.
- On empowerment gap (EG), adoption led to declined between 2.0-2.98 %.
- But, for women that lack gender parity adoption is not associated with a statistically significant change in EG

## DID Results

- for the whole sample, technology has increased the empowerment score in the 5DE by about 4.30%.
- A regional disaggregation indicate that the impact was more powerful in regions like Amhara(increase in the 5DE between 14.30 % and 15.50 % for the whole sample and women, respectively) and
- For Oromiya(increase in the 5DE between 12.90 % and 15 % for the whole sample

## Findings, Cont'd

In sum, the results indicate that almost similar impacts were produced under both approaches in magnitude as well as in signs, except in limited cases.

Comparisons of the Impact Using DID and PSM Results on 5DE and EG

Estimation method		Outcome variables			
		5DE: Total Sample	5DE: Female	EG (All Female)	EG (Female without parity)
DID		0.043(6.35) ***	0.048(5.05) ***	-0.017(2.27) **	0.028(1.48)
	NNMa	0.052(5.97) ***	0.062(5.05) ***	-0.020(3.30) ***	0.004(0.13)
PSM	RM	0.061(5.83) ***	0.083(5.67) ***	-0.030(3.58) ***	-0.013(0.98)
	KMa	0.047(5.79) ***	0.056(4.90) ***	-0.025(4.36) ***	-0.001(0.11)
	KMb	0.043(5.34) ***	0.060(5.51) ***	-0.023(4.12) ***	-0.002(0.17)
	SM	0.056(11.47) ***	0.062(5.05) ***	-0.025(4.46) ***	-0.005(0.53)

Now, go back to Q#3

## Conclusions

- Women's disempowerment(91.27 %) is almost similar to that of men's (90.32 %) one
- The sample achievement score in 5DE is 0.46 while GPI is 0.91 which implies that the ample A-WEAI is 0.50.
- From the empirical method, we found that adoption leads to 4.3 to 6.1% increase in 5DE.
- **Sex-wise**
  - the 5DE for female has been increased from 5.6 to 8.3 %
  - For male it 5DE for was 2.9 to 4.9 %.
- **Impact on each domain**
  - the domain that contributes most to women's empowerment is time use followed by resource control and use
- **impact on empowerment gap**
  - for all women we found that EG for adopter women declined between 2.0 and 2.98 %.
  - But, for women that *lack parity* adoption doesn't affect EG.
- Finally, a regional disaggregation of the impact revealed that adoption doesn't improve women's empowerment throughout all regions.
- The impact was more powerful in regions like Amhara and Oromiya
- **LAST**, we observed that the change in A-WEAI is derived by 5DE than GPI.

## Policy implications

- Though we found a strong impact of adoption on 5DE,
  - ✓ the value of both 5DE and A-WEAI are very low as compared some SSA countries
  - ✓ So, this situation needs policy intervention that increase A-WEAI and its sub-indexes, specially 5DE.

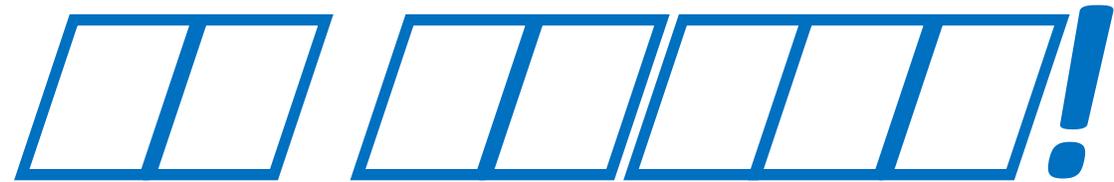
### ***Option 1***

- Implement gender responsive approaches to improve access and productivity of female farming
  - Adequate input supply(packages)
  - Delivery of adequate extension service for women;
  - Land access and tenure security/titling;
  - Strengthen rural women associations.
- 75% of women don't have access to credit or don't make sole or joint decision.
- Again, significant number of women don't have control use of income generated or owned by their household members.

### ***Option 2***

- Provide women with applicable and relevant financial sources
- Credit with minimum collaterals
- Facilitate additional income sources
- provide women direct access to resources and services

***Thank You !***



***May God save the World!!!***