

Impact of irrigation on rural farm household's nutritional outcome and potential irrigation-nutrition pathways in Kenya



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JUSTUS-LIEBIG-



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Introduction

- Irrigation viewed as a **plausible way of increasing agricultural production** in in sub-Sahara Africa through the **utilization of marginal lands**, shift from **rained-irrigation** and as an **adaptation to climatic changes**.
- However, there is need to **ensure** that the increase in agricultural production is **not an increase caloric supply** but also **addresses the regions food and nutritional insecurity**.
- Unfortunately, literature shows that **linkage of irrigation to nutritional outcomes** remain **vague** and largely **understudied**.

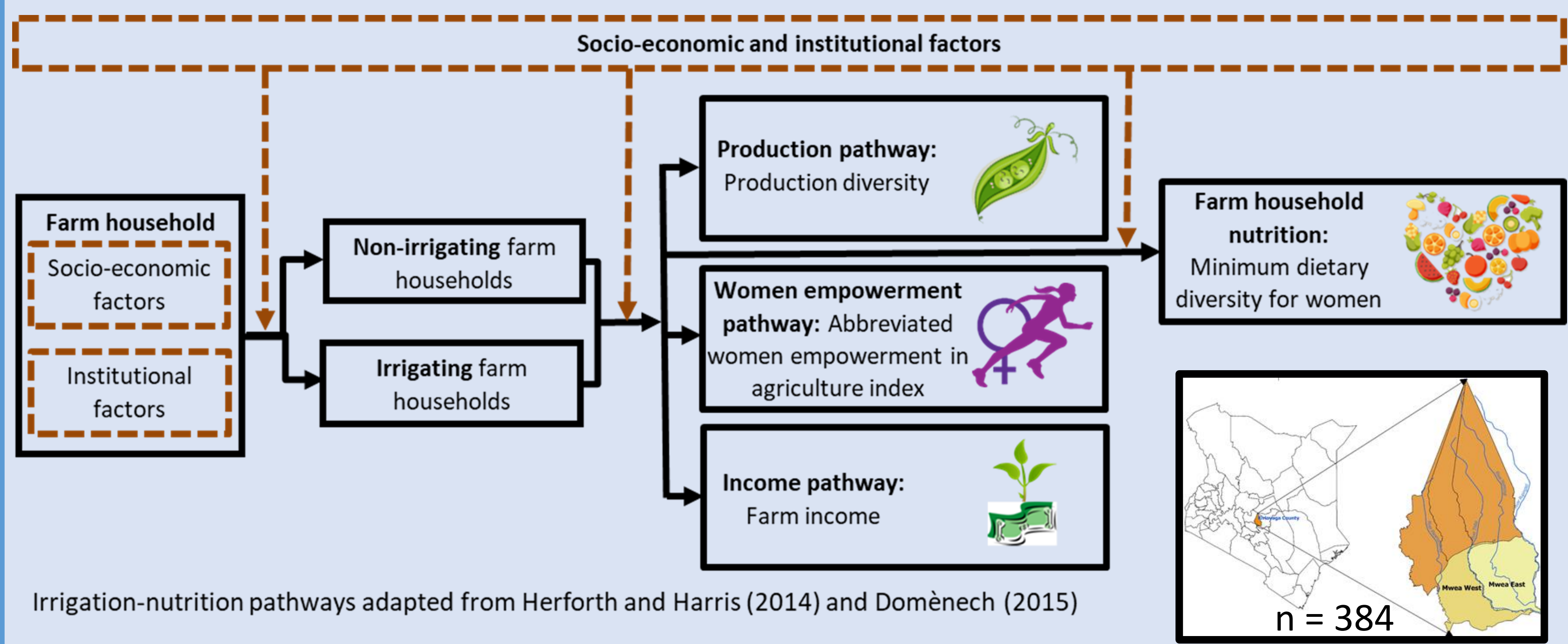
Objectives of the study

- The aim was to study the **effect of irrigation on 3 potential irrigation-nutritional pathways** and 3 **nutrition outcome** of smallholder farm households'.
- The study hypothesised 3 potential irrigation-nutrition pathways
 - Production pathway:** Irrigation increases production and allows growing of crops throughout the year increases production.
 - Women empowerment pathway:** Irrigation empowers women especially on decision-making and control over resources.
 - Income pathway:** Irrigation increases smallholder farmers' income which leads to higher expenditures on nutrition.

Materials and methods

- Data was from a **household survey** consisting **384 smallholder agricultural households** in rural **Kenya in 2021**
- Two econometric approaches were used to correct for the possible **endogeneity**:
 - Propensity score matching technique:** to address bias arising from observable characteristics; and
 - Endogenous switching regression:** to address bias from both observable and unobservable characteristics.

Conceptual framework and study area



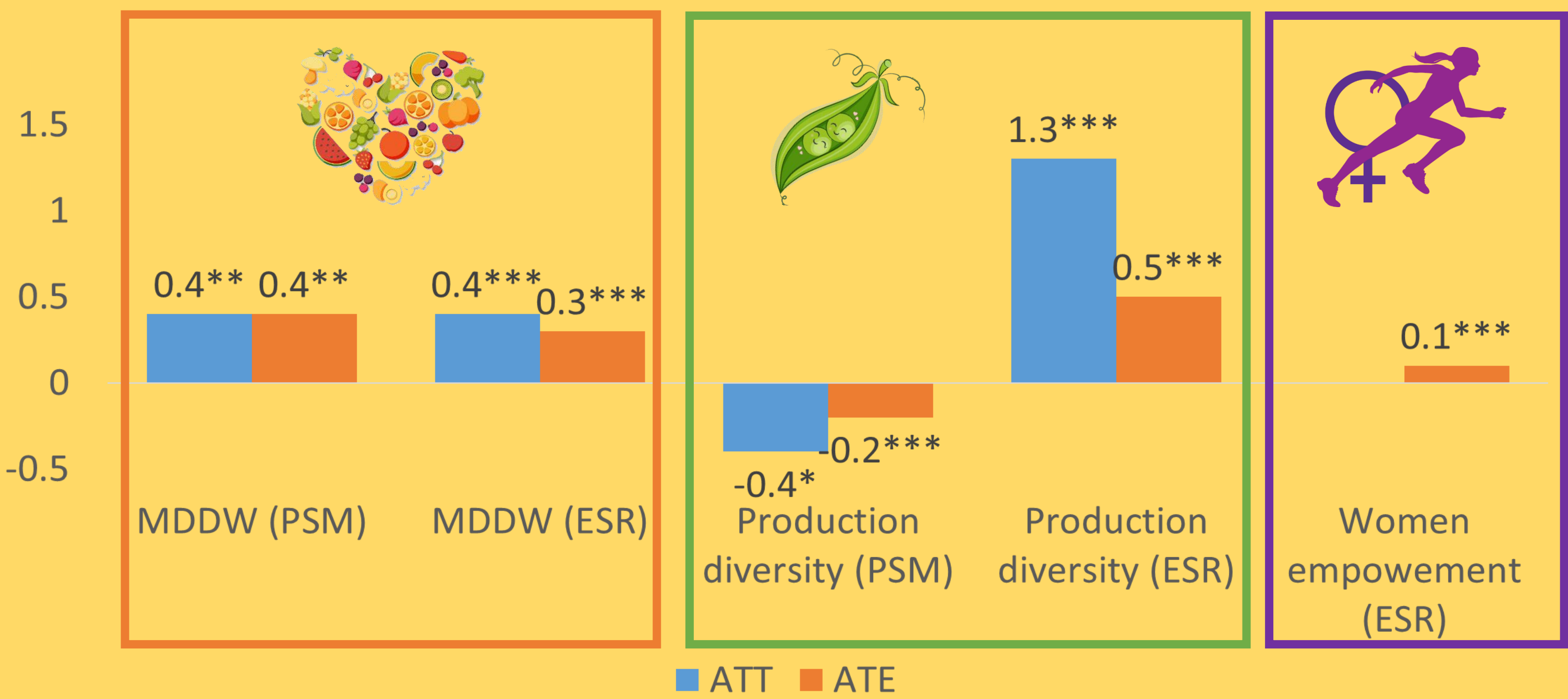
Results and discussion

Descriptive statistics

Key dependent variables	Pooled sample (n = 384)		Non-irrigators (n = 198)		Irrigators (n =186)	
	Mean	Median	Mean	Median	Mean	Median
MDDW	4.6	4.8	4.5	4.5	4.8	4.8
Production diversity	3.6	3.0	3.9	4.0	3.3	3.0
Farm income (USD)	1,368.1	441.1	746.6	184.8	2,029.6	890.1
Women Empowerment	0.7	0.7	0.7	0.7	0.7	0.7

- The measures of central tendency showed a **low dietary diversity** below the recommended threshold of 5 among the sample.
- The **irrigators had a higher dietary diversity and farm income** while the **non-irrigators had a higher production diversity**.
- The low production diversity and the high farm income by irrigators can be explained by the **tendency to specialize in high value crops** that responds to market demand.
- The women empowerment index was the same for the irrigators and non-irrigators.

MDDW, production diversity and women empowerment

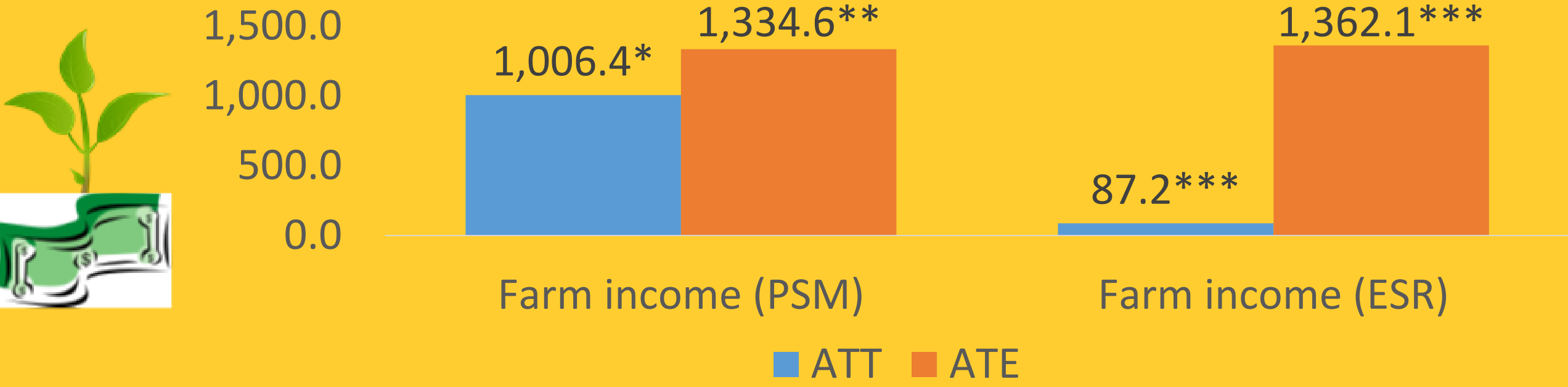


PSM - Propensity score matching technique
ATT – Average treatment effect on the treated

ESM - Endogenous switching regression
ATE Average treatment effect

- Irrigation has a **positive and significant effect** on the smallholder farmers' **dietary diversity**.
- The effect of **irrigation on production diversity showed a mixed result** in that the PSM results showed a negative effect but after controlling for the unobservable characteristics, it showed a slight positive and significant effect.
- Irrigation has a **small but significant effect on women empowerment** only after controlling for unobservable factors.

Farm income



PSM - Propensity score matching technique
ATT – Average treatment effect on the treated

ESM - Endogenous switching regression
ATE Average treatment effect

- Irrigation had a **positive and significant effect** on the smallholder farmers' households **farm income**.
- Both econometric approaches showed an almost similar effect on the ATE



Production diversity: A farm with pumpkin, maize, bananas, cassava and avocado tree



Women empowerment pathway: Women sorting sweet potatoes



Income pathway: an enumerator looks at tomatoes that the farmer is sorting for sale

Conclusions

- Irrigation positively affects the **nutritional outcomes** of smallholder farmers' households.
- Irrigation also has an **effect** on the possible irrigation-nutrition pathways of **production diversity, income and women empowerment**.
- Women empowerment** is a **critical but understudied** irrigation-nutrition pathway.

Recommendations

- Need for a **multifaceted policy approach** that is diverse on the impact pathways.
- Need for **further analysis** into the irrigation-nutrition impact pathways.
- Inclusion of **more robust econometric methodologies**.

References

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- Herforth, A., & Harris, J. (2014). Understanding and Applying Primary Pathways and Principles Brief #1. Improving Nutrition through Agriculture Technical Brief Series, (March).

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