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GENERATION AND MOBILIZATION OF NUTRITION
EVIDENCE TO TACKLE MALNUTRITION: FROM DATA TO ACTION

Determinants of Adoption of Irrigation Technology (Motorized Water Pump) and Its Implication on Household Farm Income and Food Security (Evidence from Lake Abaya and Chamo Basins of Gamo Gofa Zone, Southern Ethiopia)

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1. Introduction

- ❑ Historically, Irrigation had a positive impact on food security in developing country through producing relatively cheap food and increasing household income (Faurès *et al.*, 2007).
- ❑ At present, irrigated production is estimated to account 20% of the arable land to contribute 40% of total crop production. This share is expected to be increase to 47% by 2030(FAO, 2012).
- ❑ Ethiopian Government strategy considers irrigation development as a key input for sustainable agricultural development.

2. Statement of the Problem

- Majority of Ethiopia's farmers have been using traditional way of agricultural practices which is mostly rain-fed. This has contributed for low productivity of the agricultural sector (Yishak, 2005).
- Even though Ethiopia has a huge potential of surface and ground water availability and land is suitable for irrigation, the practices of irrigation is in its infant stage.
- More importantly, the study area also lacks empirical information regarding the determinants of MWP use and its effects on household level food security status.
- Therefore, this study initiated to fill these gaps.

3. Objectives of the Study

1. To identify the determinants of adoption of motorized water pump in the study area.
2. To examine the effects of motorized water pump on annual gross farm income of the smallholder Farmers.
3. To assess the dietary diversity consumed by user and non-user households of MWP.
4. To determine the effects of MWP use on household level food security status.

4. Methodology

- In this study, a multi-stage sampling procedures were employed for the selection of *Woreda*, sample *Kebeles* and respondent households.
- The total households live in the five sampled *Kebeles* were stratified into two strata: **adopters** and **non-adopters household**.
- According to Glenn D. Israel (2013), the total sample size from the total household heads of **4492** at 95% confidence level = **196**.

Method...

- Primary data were obtained through questionnaire, Personal observation and KII and Secondary data were obtained through referring secondary data sources.
- The data was analyzed through using frequency, percent and mean, chi-square, t-test, binary logit and Multiple linear regression

5. Result and Discussions

5.1. Determinants of Adoption of Motorized Water Pump

Table1. Determinants of Adoption of Motorized Water Pump

| Variables | B | S.E. | Wald | df | P-value | Odds Ratio |
|---------------------------------|--------------|--------|--------|----|---------|------------|
| Sex of respondents(1) | 9.998 | 51.501 | .038 | 1 | .846 | 0.000 |
| Age of respondents | -.083 | .068 | 1.518 | 1 | .218 | 0.920 |
| Education level | .678 | 1.034 | .430 | 1 | .512 | 1.969 |
| Household labor | 1.246* | .656 | 3.604 | 1 | .058 | 3.477 |
| Land holding size | 9.851 | 6.236 | 2.495 | 1 | .114 | 1.898E4 |
| Farm distance from water source | -5.902** | 2.729 | 4.677 | 1 | .031 | 0.003 |
| Use of Credit (1) | 2.906 | 6.341 | .210 | 1 | .647 | 18.291 |
| Training (1) | -1.662 | 1.307 | 1.618 | 1 | .203 | 0.190 |
| Contact with DAs. | 2.422** | 1.173 | 4.264 | 1 | .039 | 11.269 |
| Distance from Market | -3.169** | 1.452 | 4.764 | 1 | .029 | 0.042 |
| Livestock holding in TLU | -.744 | .691 | 1.159 | 1 | .282 | 0.475 |
| Distance from DA office | -1.393 | 1.863 | .559 | 1 | .455 | 0.248 |
| Contact with WUCs. | 5.868** * | 1.853 | 10.028 | 1 | .002 | 353.515 |
| Constant | -13.301 | 12.773 | 1.084 | 1 | .298 | 0.000 |

5.2. The Effect of Motorized Water Pump on Annual Gross Farm Income

Table 2 the Effect of Motorized Water Pump on Annual Gross Farm Income.

| Model | Coefficient | t-value | P-value |
|---------------------------------|--------------|---------|---------|
| (Constant) | 3216.255 | .418 | .677 |
| Age of respondent | 68.518 | .735 | .463 |
| Education level of respondent | 447.464 | .449 | .654 |
| Household labor | 275.538 | .571 | .569 |
| Land holding size | -222.122 | -.067 | .946 |
| Irrigated land size | 6620.968** | -2.441 | .016 |
| Adoption of MWP | 18555.352*** | 4.998 | .000 |
| Farm distance from water source | -150.300 | -.092 | .927 |
| Livestock holding in TLU | 141.375 | -.296 | .767 |
| use of credit from institution | 946.036 | -.333 | .739 |
| Contact with DAs per month | 771.602 | .806 | .422 |
| Market distance | -3992.815*** | 2.669 | .008 |
| Sex of respondent | 7486.572*** | -2.632 | .009 |

Dependent Variable=annual gross farm income mean=9541.7birr.

Number of observation=196

5.3. Comparison of HDDS b/n Irrigation Users and Non-users

- ❑ The Household Dietary Diversity Score was used to estimate household level food security status.
- ❑ The 12 food groups that different households consumed were used to compute the HDDS in a 24hr recall period (FAO, 2011).
- ❑ When $HDDS < 6$ categorized as food insecure household.
- ❑ When $HDDS \geq 6$ categorized as food secure household.
- ❑ Accordingly, from the total adopter 58.5% were food secure and from the total non-adopter 33 % were food secure.
- ❑ This implies that adopter households more likely to be food secure than non-adopter households.

Table3. Comparison of HDDS b/n Irrigation Users and Non-users

| HDDS | Adopter | | Non-adopter | | Total | |
|-------------|-------------|------|-------------|----|-------------|------|
| | n | % | n | % | n | % |
| <6 | 27 | 41.5 | 69 | 67 | 96 | 57.1 |
| ≥6 | 38 | 58.5 | 34 | 33 | 72 | 42.9 |
| Mean | 6.53 | | 4.02 | | 5.27 | |
| SD | 1.598 | | 1.59 | | 1.69 | |

t-value =4.769*, P-value=0.000**

☐ This also implies that MWP adopter households have more likelihood to get diversified food items than non-adopter households.

5.4. The effect of MWP on HH food security status

Table4. The effect of MWP on HH food security status

| Variables | B | S.E. | Wald | df | P-value | Odds Ratio |
|--|------------------|-------------|--------------|----------|-------------|--------------|
| Sex of respondents (1) | .626 | .397 | 2.483 | 1 | .115 | 1.869 |
| Age of respondents | -.016 | .023 | .479 | 1 | .489 | .984 |
| Education level | .062 | .231 | .072 | 1 | .788 | 1.064 |
| Household labor availability | .205 | .195 | 1.109 | 1 | .292 | 1.228 |
| Cultivable land size | .543* | .329 | 2.716 | 1 | .099 | 1.721 |
| Livestock holding (TLU) | .333** | .164 | 4.132 | 1 | .042 | 1.396 |
| Irrigation use(MWP) | 1.874*** | .703 | 7.105 | 1 | .008 | 6.516 |
| Irrigation and related training | .638 | .458 | 1.940 | 1 | .164 | 1.893 |
| Farm distance from water source | -1.267*** | .446 | 8.074 | 1 | .004 | .282 |
| Distance from output market | -.375* | .194 | 3.736 | 1 | .053 | .687 |
| Frequency of extension contact | .409 | .309 | 1.755 | 1 | .185 | 1.505 |
| Credit use(1) | -.048 | .460 | .011 | 1 | .917 | .953 |
| Constant | -2.099 | 1.458 | 2.071 | 1 | .150 | .123 |

6. Conclusion and Recommendations

- Adoption of MWP enables farm households to improve their income, minimizing risk and smoothening household consumption.
- Therefore, it is better to give attention in provision of credit to farmers; b/c it may improve their initial capital to adopt the irrigation technology.
- This finding was concluded that the adoption of MWP has significantly affects the household farm income and food security status at household level.
- Therefore, development strategies and programs related with food security should give more attention to the improvement of agricultural productivity through irrigation technologies.

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