# Socio-Economic Determinants of Drip Irrigation Adoption in Semi-Arid Sangamner, Maharashtra, India

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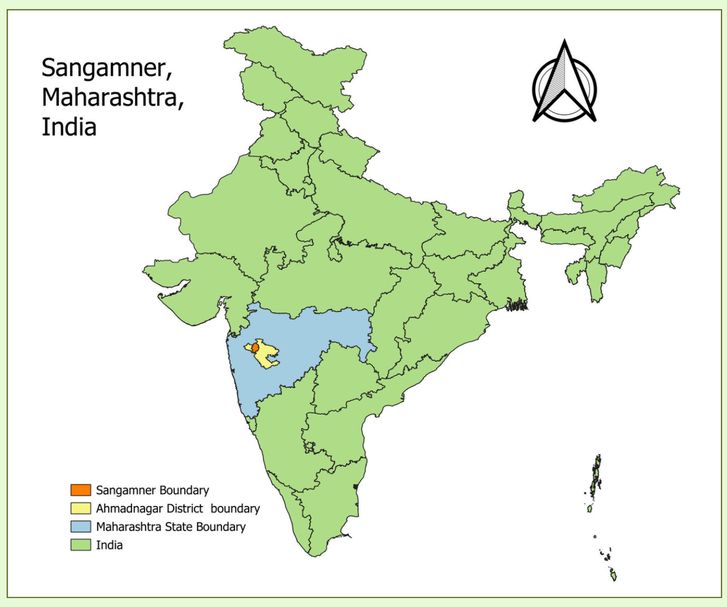
## INTRODUCTION

**Water scarcity** poses a **major threat** to agricultural sustainability in **semi-arid** Sangamner block, Maharashtra, which receives only **500-750 mm annual rainfall** which is much lower than Maharashtra's average of approximately 1,000 mm and India's national average of about 1,160 mm.




*Location of Sangamner, Ahilyanagar, Maharashtra*

- This study investigates key socio-economic factors: **education, social group, institutional (FPO) membership, landholding size, and government scheme access;** affecting drip irrigation adoption among farmers.
- Between 2008–2017, pre-monsoon groundwater fell by 0.021 m/year; post-monsoon levels dropped 0.016 m/year, affecting water availability in region.
- Over 90% of irrigated area now depends on wells, and groundwater **utilization** has reached nearly **96%** in Sangamner block.
- In this scenario, **Drip irrigation** offers a proven climate-smart solution that can **reduce water consumption by 30-70%** while improving crop yields.

*Drip irrigation*

## METHODOLOGY

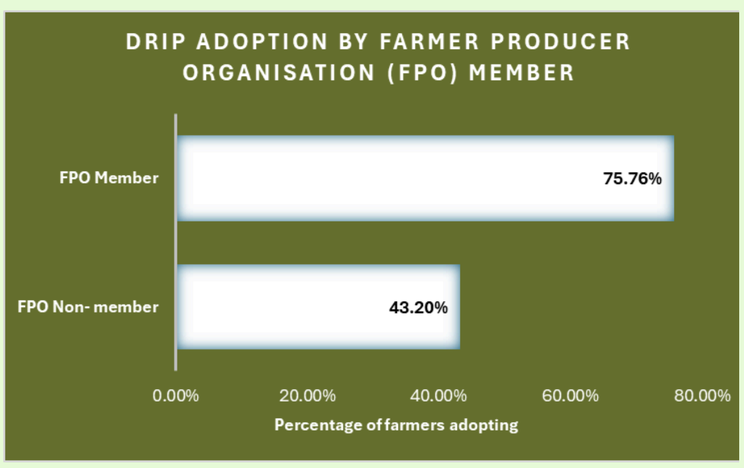
- The study employed a **cross-sectional survey design** conducted in **July 2024,** covering **159 farming households** across **six villages** (Kawthe Malkapur, Kolwade, Kumbharwadi, Pimpalgaon Depa, Shendewadi, and Warwandi) in **Sangamner, Ahilyanagar district** (formerly Ahmednagar), Maharashtra.
- **Structured interviews** collected **household demographics** (age, gender, education, social group), **farm characteristics** (land size, irrigation methods, crop choices), **institutional linkages** (FPO membership), **government scheme participation** (Kisan Credit Card, Soil Health Card, Fasal Bima Yojna), and **crop production** and yields for 2023-2024.
- **Binary logistic regression** identified significant socio-economic predictors of drip irrigation adoption among farmers.

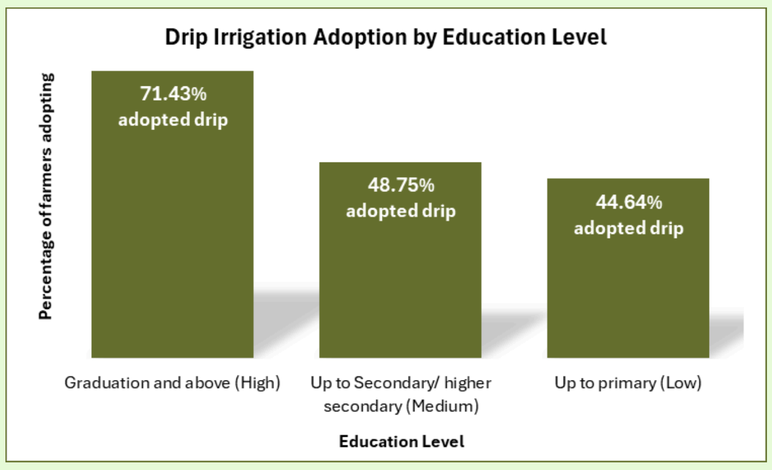
## RESULTS

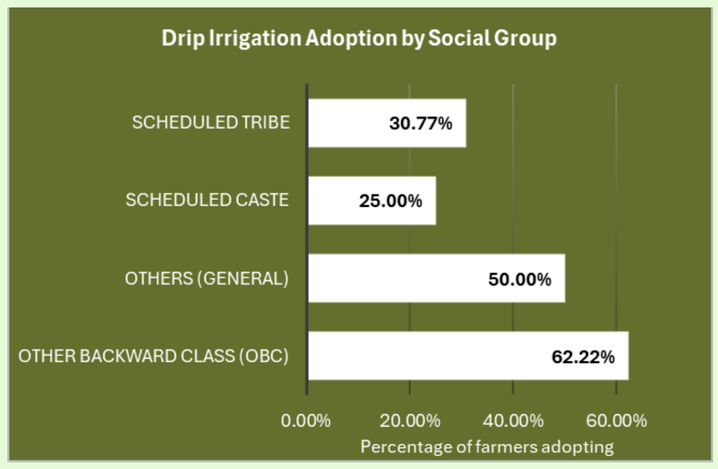
### Socio-economic Factors influencing Drip adoption by farmers

**EDUCATION LEVEL** | **LANDHOLDING SIZE** | **AGE** | **SOCIAL GROUP** | **FPO MEMBERSHIP**

- Of 159 farmers surveyed, **exactly half adopted** drip irrigation. Binary logistic regression (74% accuracy) revealed **five key determinants** of adoption
- Each additional year of **age increased** adoption of drip irrigation by **4%** (OR = 1.040, p = 0.046) in farmers.
- Each additional **acre in land size increased** drip adoption probability by **14.5%**. (OR = 1.145, p = 0.015)




- **FPO members** are about **8 times more** likely to adopt, whereas **Non-members** are **87% less likely** to adopt.(OR = 0.13; p < 0.001)
- **Low** and **medium education** levels **reduce adoption likelihood** by **84%** and **74%** vs. highly educated farmers.(OR = 0.16, 0.26; p value < 0.05)
- **Other Backward Class (OBC)** farmers are **4 times more likely** to adopt than **Scheduled tribe (ST)** households, revealing clear social inequality in access. (OR = 4.04, p = 0.004)

## CONCLUSION

This study reveals that drip irrigation adoption is primarily determined by five factors: Education, social group, FPO membership, land size, and farmer age, rather than gender or existing government schemes. The strong negative association with low education levels and marginalized social groups highlights critical equity gaps in climate-smart technology diffusion. While FPOs and larger landholdings boost uptake and high-value crops see major yield gains, current policy support remains insufficient. Addressing these disparities is essential for achieving **SDG 2 (Zero Hunger), SDG 10 (Reduced Inequalities)**, and **SDG 13 (Climate Action)** in water-stressed regions.

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