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Enhancing climate-resilient farming through digital advisory services: evidence from an RCT on SLMP adoption

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Abstract

Climate-resilient agriculture hinges on the adoption of Sustainable Land Management Practices (SLMPs), yet smallholder farmers often lack timely and actionable information to support this transition. Digital Advisory Services (DAS) have emerged as a promising tool to bridge this gap, but digital access and inclusivity remain challenges – especially for women and marginalised groups.

This study examines the impact of DAS on SLMP adoption using data from a Randomised Control Trial (RCT) conducted under the AgriPath project in 160 villages across Eastern Uttar Pradesh, India. The RCT included 1,760 farmers and tested three models of DAS delivery: self-service (via mobile apps and IVR), agent-based (in-person facilitation), and hybrid (a combination of both). Data were analysed using descriptive statistics, chi-square tests, and logistic regression.

Findings indicate that farmers with mobile phone access and exposure to DAS content were significantly more likely to adopt SLMPs such as green manuring, intercropping, and organic manuring. The agent-based model showed the highest adoption rates, particularly among female farmers, due to its personalized and accessible nature. To quantify disparities in access, a Gender Digital Inclusion Index (GDII) was constructed, revealing considerable intra-household and community-level gaps.

The results suggest that DAS, when localised and delivered through inclusive mechanisms, can substantially enhance climate resilience and sustainable land use. The study highlights the importance of integrating human facilitation, gender-sensitive approaches, and community trust into digital extension systems. Policy recommendations include strengthening digital infrastructure, investing in rural digital literacy, and scaling agent-based delivery models to ensure equitable access and uptake of SLMPs.

This research contributes to the growing evidence on the role of digital tools in climate-smart agriculture and emphasises the need for inclusive digital ecosystems to achieve sustainability at scale.

Keywords: Climate resilience, digital advisory services, gender digital divide, RCT, smallholder farmers, sustainable land management

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