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Ex-post impact of the digital and personalized recommendations in rice production: a case study of RiceAdvice application in the Senegal river valley

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Introduction

❖ Blanket advice on fertilizer application rates has failed to achieve potential yield gains for crop production in much of sub-Saharan Africa.

❖ The development of the rice value chain requires technological advances in rice production to increase yield while reducing environmental footprint.

❖ The RiceAdvice app is an Android-based decision support tools that extension agents can use to provide farming households with pre-season, field specific management guidelines for rice production (Fig. 1).

❖ Ex-post impact of personalized recommendations for rice nutrient management among farmers in the dry and wet seasons was assessed in Senegal.
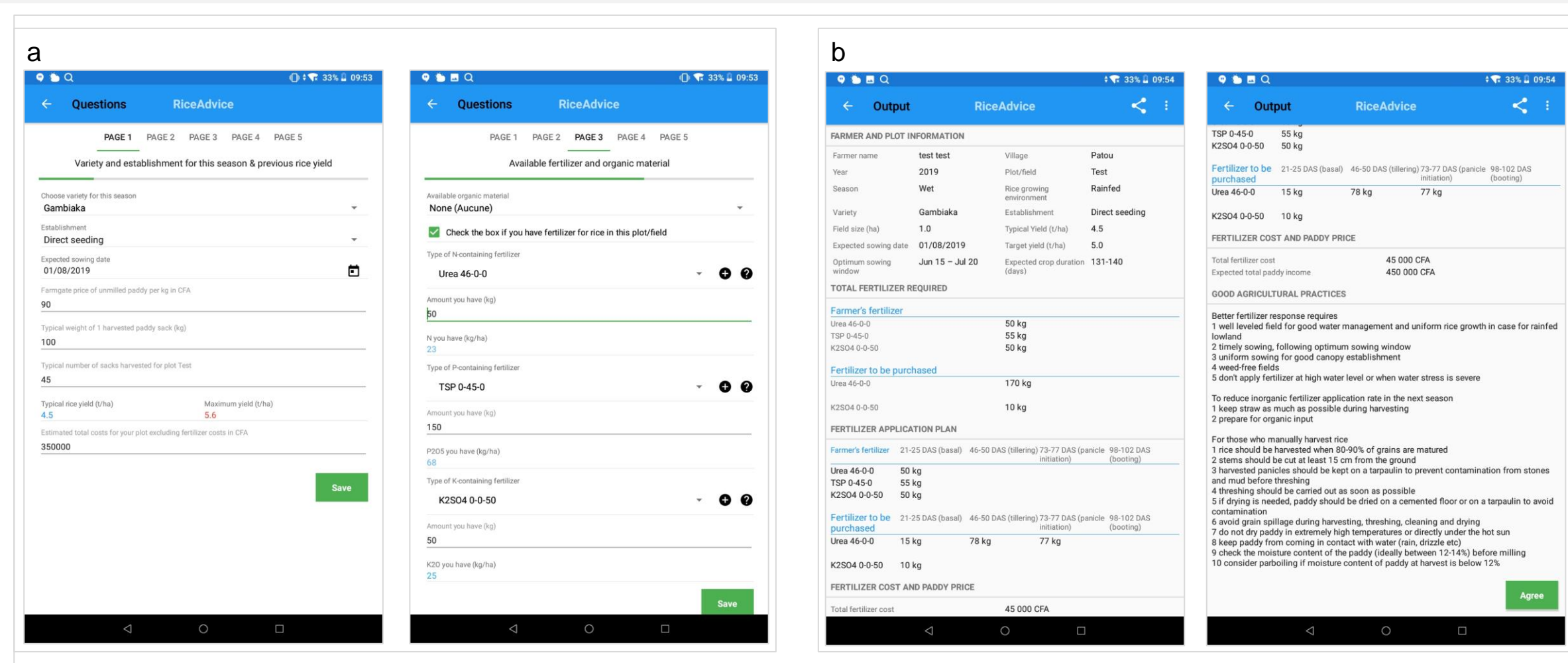

Fig. 1: RiceAdvice application. (a) provides examples of the data input screens for the app, (b) provides examples of the personalized output from the app.

Materials and Methods

❑ *Study area*

❖ The survey was conducted in the Senegal River Valley (SRV) in the northern part of the country (Fig. 2).
❖ SRV is the main rice producing region the country
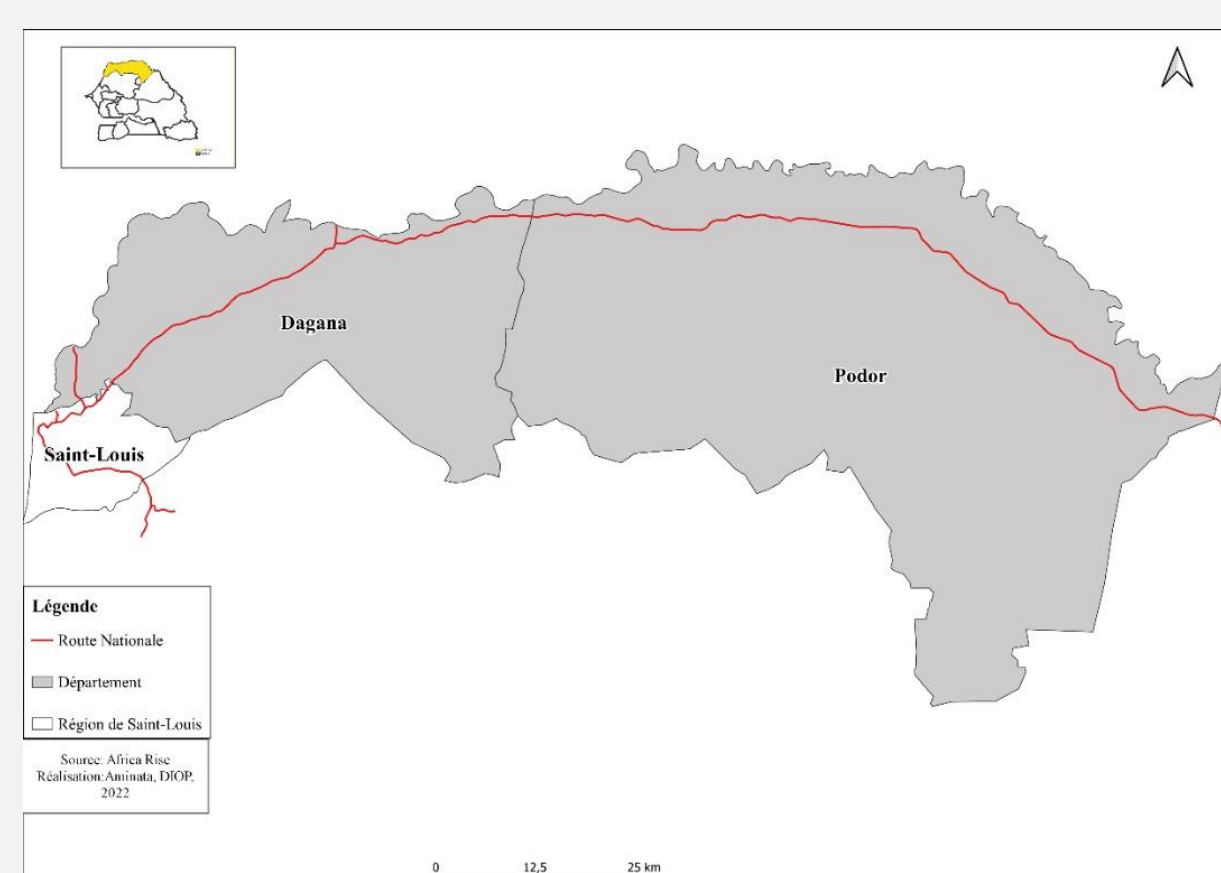❖ Rice is produced in irrigated system in the SRV

Fig. 2: Map of survey regions in Senegal

❑ *Experimental design and sampling*

❖ Two-degree stratified random sampling technique was used (Fig. 3).

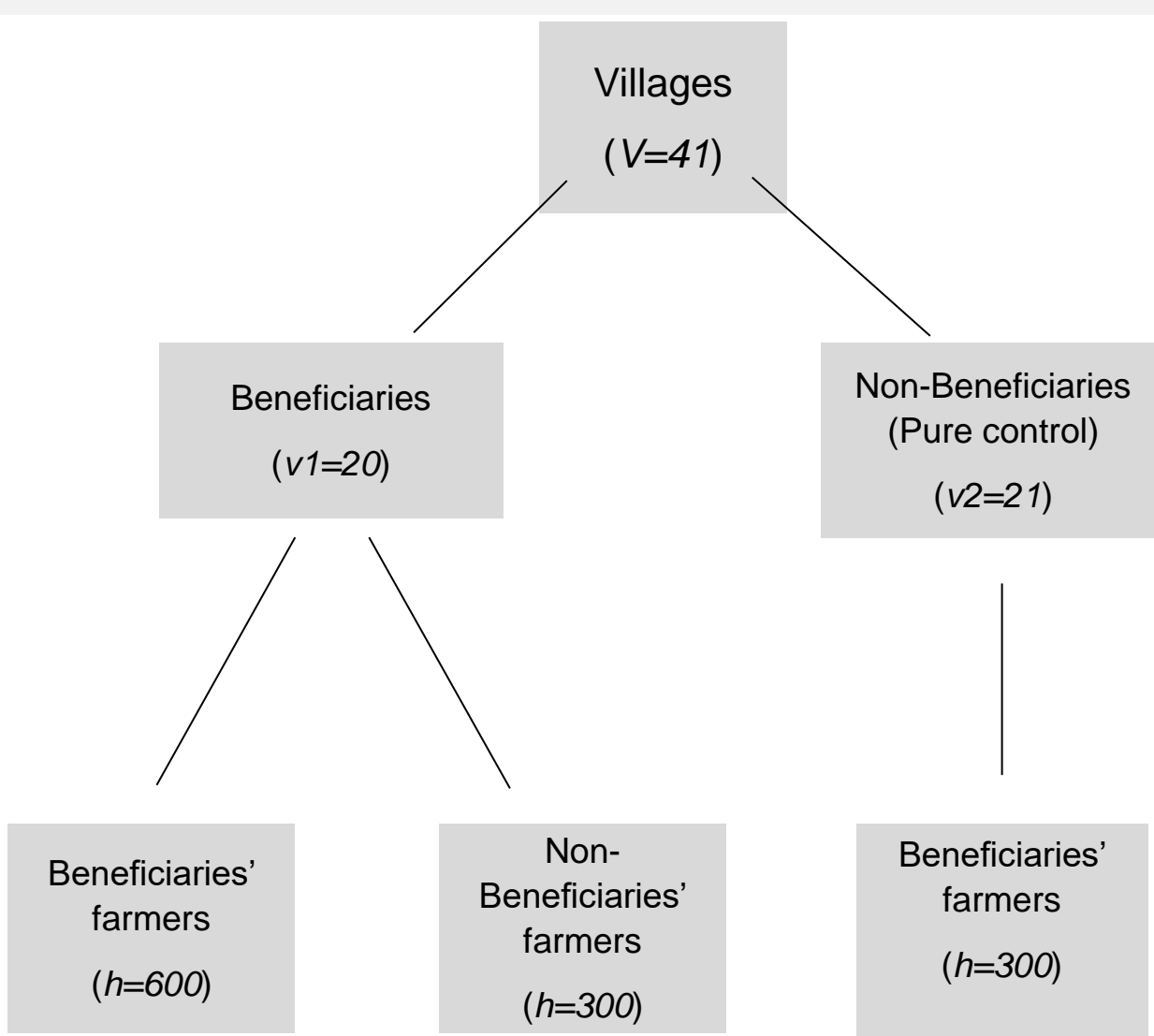❖ In total **1200** households were selected from the sampling technique in 41 villages

Fig. 3: Experimental design

❑ *Data analysis*

❖ Endogenous swishing regression (ESR) model was adopted to control for selection bias due to unobserved factors.
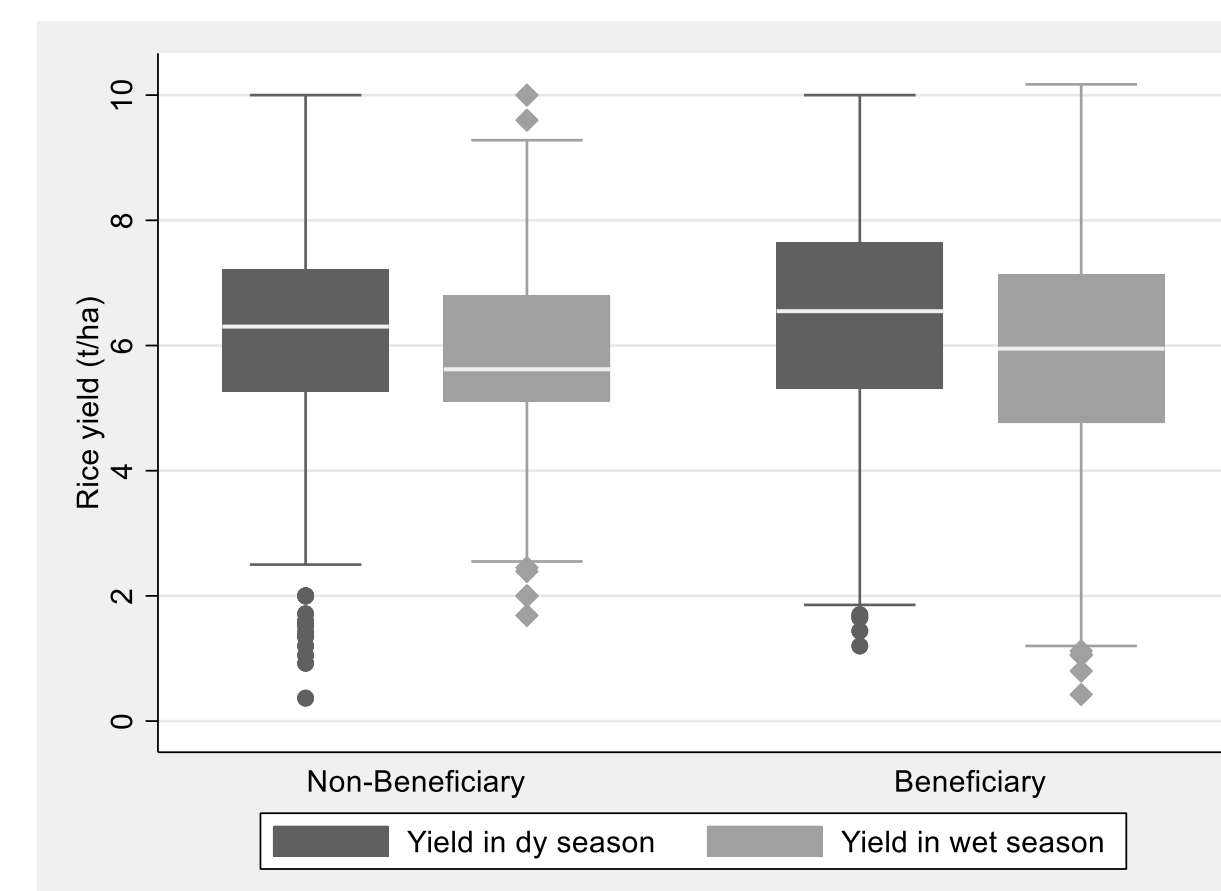
Results

Fig. 4: Rice yield per growing season and per beneficiary.

❖ Most rice farmers grew rice during the dry season because the yield were higher (Fig. 4).

❖ Formal education and contact with extension service affect the adoption of the RiceAdvice by rice farmers (Table 1).

❖ Results showed positive impact of RiceAdvice of 220kg/ha and 580 XOF/ha on yield and profit, respectively (Table 2).

Table 1. Determinants of participation.

	Coef.	Std. Err.
Sex of the household head (=1 if male)	0.640***	0.212
Formal education (=1 if Yes)	0.166*	0.090
Quantity of DAP used (Kg/ha)	-0.002*	0.001
Quantity of urea used (Kg/ha)	-0.000	0.000
Access to credit (=1 if Yes)	0.002	0.090
Distance to inputs market (km)	-0.036***	0.006
Agricultural training (=1 if Yes)	0.478***	0.090
Contact with extension service (=1 if Yes)	0.709***	0.089
Constant	-0.868*	0.491
N	1120	
p	0.000	
chi2	112.747	
Likelihood	-2764.622	

Note: * p<0.10, ** p<0.05, *** p<0.01

Table 2. Endogenous switching regression treatment effects.

	Decision stage		ATE
	Beneficiary	Non-beneficiary	
Yield (T/ha)			
Beneficiary (ATT)	6.44	6.22	0.22***
Non-beneficiary (ATU)	6.21	8.24	2.03***
Heterogeneous effects	0.23	-2.02	2.25
Profit (US$/ha)			
Beneficiary (ATT)	795.45	216.19	579.26***
Non-beneficiary (ATU)	748.41	860.5	112.09***
Heterogeneous effects	47.04	-644.31	691.35

Note: ATE-average treatment effect; ATT-average treatment effect for treated. ATU-average treatment effect for untreated; *** p < 0.01.

Conclusion

➤ Personalized advice (RiceAdvice) increases yields and profit of smallholder farmers.

➤ Socio-economic, institutional and perception characteristics affect the adoption of the RiceAdvice app by rice farmers.

➤ More targeted information to farmers can improve livelihood and prevent negative environmental effects.

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