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Key research insights

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Busara

What are the barriers and enablers to the uptake of chisel ploughing?

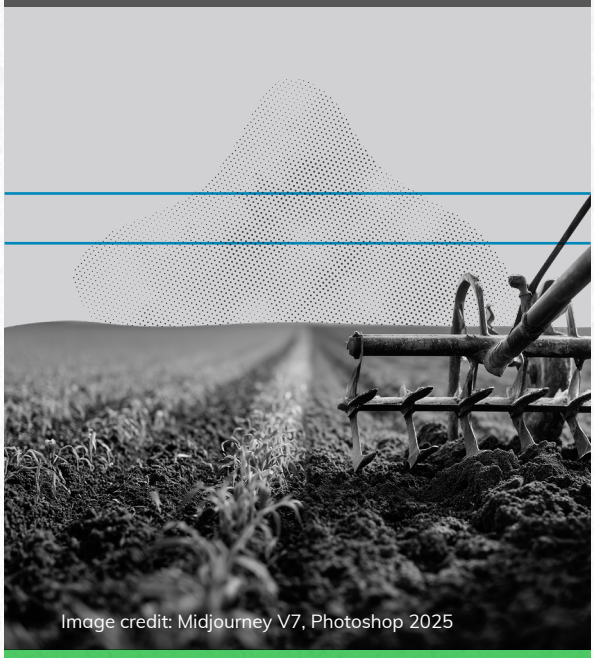

Image credit: Midjourney V7, Photoshop 2025

Exploring factors that influence the uptake of the chisel plough.

project facts

Key words
Agriculture technology decision making, Deep tillage, Uptake

Behavioral themes
Perceptions, Awareness, Peer-influence

Research design
Qualitative study - with focus group discussions (FGDs), key informant interviews, and co-design and validation sessions

Scope
Start date: August 2024
End date: November 2024
n= 74 participants
32 in Makueni; 42 in Kilifi

Location
Kilifi County and Makueni County (Wote) in Kenya

Partner
FIPS- Africa

Background: Increasing the uptake of chisel ploughing

Climate change, poor soil structure, low rainfall, and even lower water retention in the semi-arid regions of Kenya continue to be issues that result in reduced crop yields. Further compounding this problem is the presence of hardpan—a compacted soil layer approximately 10 centimetres from the surface.

In collaboration with FIPS, we explored the factors that affect the adoption of the chisel plough—a tool designed to penetrate deeper into the soil, breaking the hardpan, and allowing for better water retention in the semi-arid regions in Kenya. We also collaborated with local blacksmiths to design and propose cost-effective interventions aimed at increasing the adoption of chisel plough technology while improving agricultural productivity.

Conducting the research

Our approach involved using qualitative research methods, namely focus group discussions and key informant interviews.

We conducted focus group discussions with both male and female smallholder farmers consisting of 55 farmers and 19 key informant interviews with stakeholders such as village based advisors (VBAs), tractor service providers (TSPs), agro-dealers, ward agricultural officers and government representatives.

This was carried out to ensure we explore all the facets of technology adoption across genders and expert viewpoints while identifying the barriers and enablers of the uptake of chisel ploughs.

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Key Research Insights

- Farmers who have adopted the chisel plough are experiencing yield increases, a success observed by neighboring farmers.
- Observing the positive outcomes of their peers has encouraged other farmers to adopt the chisel plough, demonstrating a strong effect of social proof within the community.
- Pre-ploughing clearing is time-consuming and laborious, offsetting the reduced effort during chisel ploughing.
- Participants from both Makueni and Kilifi identified financial constraints, limited tractor availability, and challenging land terrain (due to knowledge gaps) as their top concerns, that prevent them from switching to a chisel plough.

Implications

For policy makers:
Increasing awareness and sensitization to the use and benefits of mechanisations is likely to enhance the uptake of deep tillage technologies in farming, since social proof was an evident factor that influenced farmers in considering and using the chisel plough.

Structural barriers such as availability and accessibility to amenities such as tractor services often act as a hindrance to uptake even in light of increasing awareness. Therefore, a more holistic solution would cover both structural and behavioral barriers to ensure success.

Recommendations for future research

Further research is required to assess the impact of service accessibility, availability, affordability, and the role of collective action in driving the uptake of these innovations and overcoming behavioral barriers influencing the adoption of deep tillage technologies.

Further reading

Meijer, S. S., Catacutan, D., Ajayi, O. C., Sileshi, G. W., & Nieuwenhuis, M. (2014). The role of knowledge, attitudes and perceptions in the uptake of agricultural and agroforestry innovations among smallholder farmers in sub-Saharan Africa. *International Journal of Agricultural Sustainability, 13*(1), 40–54. https://doi.org/10.1080/14735903.2014.912493

Otara, E. N., Mogaka, H. R., Ndirangu, S. N., & Mugwe, J. N. (2023). Socioeconomic Factors Influencing Uptake of Regenerative Agriculture Technologies in the Dry-lands of Embu County, Kenya. *Journal of Agricultural Extension, 27*(1), 1–12. https://doi.org/10.4314/jae.v27i1.1

Mumah, E., Chen, Y., Hong, Y., & Dickson Okello. (2024). Machinery Adoption and Its Effect on Maize Productivity among Smallholder Farmers in Western Kenya: Evidence from the Chisel Harrow Tillage Practice. *Research on World Agricultural Economy,* 5(1), 1–18. https://doi.org/10.36956/rwae.v5i1.983

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