Smart Farming, Unequal Access: AI and India's New Agricultural Divide

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ABSTRACT

Artificial intelligence can bring timely crop, weather, pest and market advice to millions of Indian farmers. Yet the same technology can also reproduce existing inequalities when access depends on a smartphone, a stable signal, a formal land record or a language that the system understands. This article explains how unequal connectivity, gendered control of devices, invisible tenancy, biased datasets and weak accountability may create a new agricultural divide. It argues for a human-plus-AI model built on low-bandwidth access, local-language testing, recognition of actual cultivators, transparent uncertainty and accessible grievance redressal. Smart farming will be genuinely smart only when its benefits reach farmers who are currently least visible to digital systems.

INTRODUCTION:

Imagine a farmer photographing a yellowing leaf and receiving, within seconds, a local-language diagnosis and treatment suggestion. For one farmer, that advice may prevent a serious loss. For another, it may remain unreachable because the phone is shared, the signal is weak, the local crop name is misunderstood or the cultivator is missing from the land record. The technology may be identical, but the opportunity is not.

This is the central paradox of India's smart-farming transition. AI can translate complex data into practical decisions, support extension

staff and help public agencies respond at scale. However, digital agriculture is shaped not only by model accuracy but also by institutions, skills, power, data ownership and the diversity of farms included during design (Klerkx *et al*., 2019). The crucial question is therefore not simply whether AI works, but for whom it works and who bears the cost when it fails.

The Promise Is Real

India is rapidly building a digital public infrastructure for agriculture. AgriStack, the Krishi Decision Support System and digital crop surveys aim to connect farmer, plot, crop, weather and satellite information. By 4 February 2026, more than 8.48 crore Farmer IDs had been generated. Kisan e-Mitra was answering farmer queries in 11 regional languages, while the National Pest Surveillance System was supporting image-based pest identification for 65 crops and more than 400 pests (Ministry of Agriculture & Farmers Welfare, 2026). These initiatives can make public advice faster, more consistent and more widely available. But digital reach must not be mistaken for equal access.

Where the New Divide Appears

Connectivity is the first barrier. At the end of December 2025, India had 434.27 million rural internet subscribers, but subscriptions per 100 people were 47.63 in rural areas and 116.09 in urban areas (Telecom Regulatory Authority of India [TRAI], 2026). A signal alone is also insufficient: useful access requires a charged device, affordable data, digital confidence and enough bandwidth when a pest outbreak or weather shock occurs.

Access within a household is unequal too. NFHS-6 reports that 63.6% of women aged 15-49 had a mobile phone they themselves used; more than one-third therefore still lacked personal phone access (Ministry of Health & Family Welfare, 2026). An advisory sent only to the registered male landowner may never reach the woman managing seed, livestock, weeding or post-harvest work. Shared phones can further limit privacy and freedom to seek advice.

Digital identity creates another fault line. Tenants, sharecroppers, oral lessees, cultivating family members and users of customary land may carry the production risk without appearing as the recognised owner. If a verified digital identity becomes the gateway to advice, credit, insurance or relief, a record mismatch can become an economic penalty. Language and data introduce similar risks: a model trained on standard Hindi, English, commercial crops or irrigated regions may misread a dialect, minor crop, local variety or mixed-farming system.

Finally, a fluent answer is not necessarily a safe answer. A wrong pesticide, veterinary or credit recommendation can waste money and harm crops, health or the environment. Farmers need to know when advice is uncertain, who supplied the underlying data and where a disputed recommendation or automated rejection can be reviewed.

Table 1

From digital barrier to inclusive design response

Dimension	How exclusion occurs	Inclusive design response
Connectivity	Weak/costly data; shared phones	Voice, SMS, offline and assisted access
Gender/ identity	Women/tenants may be excluded	Women-first access; cultivator appeal
Language/ data	Local languages/crops may be missing	Regional testing with local experts
Accountability	Wrong advice hard to challenge	Uncertainty labels; human review

Note. Authors' synthesis based on Ministry of Agriculture & Farmers Welfare (2026), Ministry of Health & Family Welfare (2026), TRAI (2026) and Klerkx *et al*. (2019).

AI Should Strengthen Extension, Not Replace It

Farmers also need field diagnosis, demonstration and follow-up. AI should strengthen, not replace, extension. It can help Krishi Vigyan Kendras, state departments and Farmer Producer Organisations prioritise cases, while trained personnel validate high-risk advice and interpret local conditions.

Building an Inclusive System

Every major service should offer smartphone, voice, SMS, assisted village and low-bandwidth or offline access. Public advice should not require a premium device or continuous data.

Performance should be reported across farm sizes, genders, tenancy groups, languages and regions. National accuracy can hide failure for tribal areas, women or minor crops. Social audits should track who uses the service, who drops out and which queries remain unresolved.

Farmers need rights to explanation, correction and appeal. High-risk advice should show uncertainty and refer doubtful cases to qualified personnel. Records affecting insurance, credit or relief must be correctable. Testing with farmers, extension workers and local-language experts helps systems learn from lived realities, not only convenient datasets.

CONCLUSION

India need not choose between technological progress and social justice. AI can reduce information gaps and extend scarce expertise, but a system that is intelligent only for the well-connected will deepen existing inequality. The real test of smart farming is simple: can the farmer with the least land, weakest signal and smallest institutional voice use the system safely, question it confidently and benefit from it fairly?

REFERENCES

Klerkx, L., Jakku, E., & Labarthe, P. (2019). A review of social science on digital agriculture, smart farming and agriculture 4.0: New contributions and a future research agenda. *NJAS: Wageningen Journal of Life Sciences, 90-91*, Article 100315. https://doi.org/10.1016/j.njas.2019.100315

Ministry of Agriculture & Farmers Welfare. (2026, February 10). *New farming techniques and digital services* [Press release]. Press Information Bureau. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2225993

Ministry of Health & Family Welfare. (2026, May 29). *NFHS-6 reflects India's accelerated progress in maternal and child health, nutrition, fertility, and women's empowerment* [Press release]. Press Information Bureau. https://www.pib.gov.in/Press Release Page. aspx? PRID=2266600

Telecom Regulatory Authority of India. (2026). *The Indian telecom services performance indicators: October-December 2025*. https://www.trai.gov.in/sites/default/files/2026-03/QPIR_03032026_0.pdf.