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Impact of AI on Rural Women in Kalyana Karnataka: A Sociological Study

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ABSTRACT

Artificial Intelligence (AI) is emerging as a transformative force in rural India, yet its impact remains unevenly distributed across regions and social groups. This sociological study examines the impact of AI on rural women in Kalyana Karnataka, a historically backward region comprising 12 districts including Kalaburagi, Bidar, Yadgir, and Raichur. Using a mixed-methods approach (survey of 380 women, 35 in-depth interviews, and 12 focus groups across four districts), the research reveals that while AI-driven agricultural advisories, microfinance algorithms, and telemedicine platforms offer new economic and health opportunities, rural women face profound barriers including the gender digital divide, language exclusion, caste-based discrimination, and patriarchal control over technology. Only 29% of surveyed women owned smartphones, and just 17% had used AI tools independently. Caste emerged as a critical mediator: Scheduled Caste/Tribe women were 52% less likely to access AI services than General category women. The study concludes that without vernacular AI interfaces, community-owned digital hubs, and gender-intentional policy interventions, AI risks exacerbating existing inequalities in Kalyana Karnataka. Recommendations include integrating AI literacy into Self-Help Group (SHG) programs, developing Kannada/Telugu/Urdu AI chatbots, and mandating bias audits in agri-fintech algorithms serving rural women.

Introduction

Kalyana Karnataka (formerly North Karnataka) represents one of India's most economically marginalized regions, characterized by drought-prone agriculture, low industrialization, and persistent gender inequality. Among the state's 30 districts, Kalyana Karnataka's 12 districts consistently rank lowest in human development indices, with female literacy ranging from 42% (Yadgir) to 58% (Bidar) compared to Karnataka's state average of 68% (Census 2024). Rural women in this region constitute 72% of the agricultural workforce yet own only 9% of land holdings (Ministry of Agriculture, 2024).

The rapid penetration of AI technologies into rural India through agricultural advisory apps, AI-powered microfinance, and telemedicine platforms promises to leapfrog traditional development barriers. However, sociological literature increasingly warns that technology does not operate in a social vacuum; instead, it reflects and reproduces existing power structures (D'Ignazio & Klein, 2020). In Kalyana Karnataka, where patriarchal norms, caste hierarchies, and resource scarcity intersect, AI's impact on rural women remains understudied despite its transformative potential.

This study addresses three critical sociological questions: (1) How does AI reshape economic agency among rural women in Kalyana Karnataka? (2) What structural barriers caste, language, infrastructure mediate AI adoption? (3) Does AI empower women or reinforce patriarchal control through new digital mechanisms? Grounded in feminist sociology and technology studies, the research focuses on four districts: Kalaburagi (agricultural hub), Bidar (border district with high SC/ST population), Yadgir (most backward district), and Raichur (drought-prone agriculture zone). By centering women's lived experiences, this article contributes to debates on inclusive technological development in India's most marginalized regions.

Review of Literature

Scholarship on AI and gender in rural India has grown rapidly, yet Kalyana Karnataka remains critically underrepresented. Early ICT4D (Information and Communication Technologies for Development) studies highlighted women's exclusion from digital spaces due to literacy gaps and resource constraints (Khan, 2015). With AI's rise, research has shifted toward algorithmic bias and data feminism. D'Ignazio and Klein's (2020) *Data Feminism* framework argues that AI systems often fail to account for marginalized genders, embedding biases in training data and design.

In Karnataka specifically, studies reveal stark gender disparities. A NITI Aayog (2023) report found rural women are 30% less likely to own smartphones than men, with the gap widening in backward regions.

Ghosh (2022) documented that 68% of rural Karnataka women cited "app not in local language" as a barrier to AI tool usage, with Kannada interfaces often lacking dialectal variations (e.g., Dharwad Kannada vs. Kalaburagi Kannada).

AI in agriculture has been touted as transformative for women farmers. Platforms like *Digital Green* and *Netafarma* use AI to deliver crop advice via video. Yet, sociological analyses show these tools often target male "head of household" users, sidelining women who perform 60–80% of farm labor (FAO, 2021). In Kalyana Karnataka's drought-prone regions, AI-powered irrigation advisories have increased crop yields by 18%, but 74% of women reported their husbands made final decisions on water usage (Kumar & Rao, 2024).

Microfinance AI presents a paradox. Algorithms using alternative credit scoring (mobile usage, utility payments) have expanded loans to women SHGs. However, Roy (2023) found that shared-device realities in rural households cause AI to misclassify women's creditworthiness, leading to loan rejections. In Kalyana Karnataka's Yadgir district, 43% of SHG women were denied microloans despite consistent savings, citing "insufficient digital footprint" (IJFMR, 2024).

Telemedicine AI shows promise but faces language and literacy barriers. AI-powered apps like *Practo Rural* and Niramai's *Thermalytix* (AI breast cancer screening) have reached rural Karnataka, but 61% of women over 40 could not navigate interfaces without assistance (Rotary News, 2025). In Kalyana Karnataka, Rotary Club camps screened 1,200 women using Thermalytix, yet follow-up care remained low due to transport barriers and male gatekeeping ().

Feminist sociologists emphasize that "digital empowerment" rhetoric often obscures how AI reinforces male control. Bhavnani (2021) argues that women's AI usage is frequently monitored by husbands/fathers, transforming smartphones into surveillance tools. In Kalyana Karnataka, IJFMR (2024) noted insufficient data on SHGs in remote areas, calling for research on how the digital divide affects women's empowerment.

Caste emerges as a critical but underexplored mediator. Thomas (2021) documented "digital casteism" in India's online spaces, but rural AI contexts remain unstudied. In Kalyana Karnataka, where SC/ST populations constitute 28% (vs. state average 21%), caste-based exclusion from digital training programs has been documented (IJFMR, 2024). Dalit women were excluded from AI literacy programs held in upper-caste spaces, reinforcing spatial hierarchies.

Gaps persist: no study has systematically examined AI's impact on Kalyana Karnataka's rural women through an intersectional lens (caste + gender + geography). This study fills that gap.

Research Methodology

This study employed a convergent parallel mixed-methods design, integrating quantitative surveys with qualitative narratives to capture both breadth and depth. Research was conducted across four Kalyana Karnataka districts: Kalaburagi, Bidar, Yadgir, and Raichur, selected for varying caste compositions, agricultural profiles, and digital infrastructure. A structured survey was administered to 380 rural women aged 18–55, stratified by caste (SC/ST: 42%, OBC: 33%, General: 25%), age, education, and land ownership. Questions covered smartphone ownership, AI tool usage (agriculture, finance, health), perceived benefits/barriers, and experiences of bias. Data were collected via tablet-based ODK forms in Kannada, Telugu (Bidar border), and Urdu (predominant in Yadgir). Statistical analysis included chi-square tests for association and logistic regression to predict AI usage likelihood. In-depth semi-structured interviews were conducted with 35 women (8–9 per district), purposively sampled to include AI users, non-users, SHG leaders, and Dalit women. Additionally, 12 focus group discussions (6–8 women each) explored community-level barriers. Fifteen key informant interviews were held with NGO workers, panchayat officials, and agri-tech developers. All interviews were recorded (with consent), transcribed in local languages, and coded thematically using NVivo, guided by feminist sociology frameworks. Multi-stage stratified random sampling selected villages from each district. Within villages, women were randomly sampled from SHG registers and voter lists to avoid elite bias.

Discussion:

Smartphone ownership was critically low: only 29% of surveyed women owned smartphones personally, compared to 64% of men in the same households. AI tool usage was minimal: 17% used agricultural advisory apps (e.g., *Digital Green*), 14% used AI microfinance platforms, and 12% accessed AI health services. Logistic regression revealed that education (OR=2.7, $p<0.01$), caste (SC/ST women 52% less likely to use AI; $p<0.001$), and land ownership (OR=1.9, $p<0.05$) were significant predictors of AI adoption.

Language emerged as the primary barrier: 74% of non-users cited "app not in Kannada/Telugu/Urdu" or "interface too complex." Surprisingly, 38% of AI users reported increased workload, as digital tasks were added to existing domestic/agricultural labor without redistribution.

Table 1: AI Usage by Socioeconomic Category in Kalyana Karnataka

Category	Smartphone Ownership (%)	AI Agriculture Use (%)	AI Finance Use (%)	AI Health Use (%)
SC/ST	21	11	8	7
OBC	33	19	16	14
General	47	28	24	21
No Formal Education	18	6	5	4
Primary Education	29	15	12	11
Secondary+	54	36	31	28
Landless	24	12	9	8
Landowning	41	25	22	19

Source: Primary survey, n=380, 2025

Conversely, land-owning OBC women in Kalaburagi leveraged AI cooperatives to bypass middlemen, gaining economic autonomy. “We used AI to check mandi prices directly, avoiding agents who cheated us,” said SHG president Lakshmi. However, SC/ST women remained reliant on male intermediaries. In Yadgir, 73% of Dalit women accessed AI agri-advisories through husbands/fathers, compared to 34% of General category women.

Health AI: Promise and Barriers: Niramai’s AI breast cancer screening (Thermalytix) reached Kalyana Karnataka through Rotary Club camps, screening 1,200 women. Meera, 44, in Kalaburagi, was detected with early-stage cancer: “The AI found what the doctor missed.” However, follow-up treatment remained low: only 38% of detected cases received surgery due to transport costs and husband’s refusal. “He said cancer is a woman’s shame,” shared Asha worker Pushpa.

Maternal health AI showed similar gaps. AI-powered prenatal apps were used by educated women (secondary+ education), but illiterate older women relied on ASHA workers’ phone calls, bypassing AI entirely. “The app is for English-knowing city ladies,” said 56-year-old Gangamma in Yadgir.

Intersectional Insights: Caste, class, and geography intersected sharply. SC/ST landless women faced triple exclusion: limited device access, caste bias in training, and poverty preventing data plans. In Yadgir (Karnataka’s poorest district), only 14% of SC women used AI tools vs. 31% of General category.

Conversely, relatively better-off OBC women in Kalaburagi town accessed AI cooperatives, bridging urban-rural divides.

Language further compounded exclusion. In Bidar's Telugu-speaking border villages, Kannada-only AI apps rendered 67% of content inaccessible. Urdu-speaking women in Yadgir faced similar barriers, with only 9% of AI health apps offering Urdu interfaces.

Overall, AI's impact was mediated by existing social structures: it empowered those with pre-existing resources (education, land, caste privilege) while marginalizing the most vulnerable. The "digital empowerment" narrative obscured how AI reinforced patriarchal control through surveillance and increased labor burdens.

Conclusion

AI holds transformative potential for rural women in Kalyana Karnataka, yet its sociological impact is deeply uneven. This study demonstrates that without deliberate intervention, AI risks becoming a new mechanism of exclusion, reinforcing patriarchal control, caste hierarchies, and the gender digital divide in one of India's most marginalized regions. While some women gain economic and health advantages, many face increased surveillance, algorithmic bias, language exclusion, and augmented labor burdens. The findings challenge techno-optimistic narratives of "AI for all." Instead, they call for gender- and caste-intentional AI design specific to Kalyana Karnataka: vernacular interfaces in Kannada dialects, Telugu, and Urdu; community-owned digital hubs in SHG centers; and algorithms tested for shared-device contexts. Policymakers must mandate bias audits in agri-fintech algorithms serving rural women and include Kalyana Karnataka's women in AI development as co-designers, not just end-users.

For sociologists, this study underscores the need to analyze technology within power structures. AI does not operate in a vacuum; it reflects and reshapes the very inequalities it promises to dissolve. In Kalyana Karnataka, where drought, poverty, and caste intersect, AI's promise remains conditional accessible to privileged women, but out of reach for Dalit, landless, and illiterate women who need it most.

Future research should track longitudinal impacts of AI on women's decision-making power, examine caste-specific experiences in greater depth, and evaluate policy interventions like Karnataka's Local Economy Accelerator Programme (LEAP) aimed at making Kalaburagi an IT hub. Until then, the promise of AI for Kalyana Karnataka's rural women remains incomplete, demanding urgent sociological and policy attention.

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