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Digital Infrastructures and Social Practice

An Ethnography of Connectivity and Exclusion in Rural Guinea-Bissau

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ABSTRACT

The expansion of digital infrastructures into rural Africa is often framed as a straightforward path to development, yet the lived experiences of integration and the persistence of exclusion remain under-examined in West African contexts. This study aims to ethnographically document and analyse the social practices, perceptions, and structural conditions shaping digital connectivity and its absence in a rural setting, moving beyond binary notions of access. A 14-month immersive ethnography was conducted in two rural villages, employing participant observation, in-depth interviews, and digital practice diaries with residents, community leaders, and mobile network agents. Findings reveal that while mobile internet coverage was technically present, substantive engagement was mediated by a complex ecology of cost, literacy, and social negotiation. A dominant theme was the strategic pooling of resources to purchase data, which simultaneously reinforced existing kinship bonds and created new dependencies. Approximately 70% of interviewees described connectivity as a sporadic luxury rather than a utility. Digital inclusion is a deeply relational and materially constrained process, where infrastructural presence does not equate to meaningful integration, often reproducing pre-existing social and economic hierarchies. Policy should shift from a focus on infrastructure rollout to supporting community-managed access models and digital literacy programmes embedded in local social structures. Regulatory frameworks must address predatory pricing for prepaid data in rural areas. digital divide, ethnography, mobile technology, West Africa, social practice, infrastructure, exclusion This paper provides a novel, practice-centred analysis of the digital divide, demonstrating how connectivity is socially orchestrated and contested within kinship networks, thereby challenging top-down models of digital diffusion.

Keywords: *Digital ethnography, digital divide, West Africa, connectivity, social exclusion, rural infrastructure, digital inclusion*

Article Highlights

- Mobile internet coverage existed technically, yet 70% of residents described connectivity as a sporadic luxury.
- Resource pooling for data purchases reinforced kinship bonds while creating new dependencies.
- Digital inclusion is a relational process where infrastructure presence doesn't guarantee meaningful integration.
- Policy must shift from infrastructure rollout to community-managed access and literacy programmes.

Methodological Note

14-month immersive ethnography in two rural villages using participant observation, interviews, and digital practice diaries.

This study challenges top-down digital diffusion models through practice-centred analysis.

Introduction

The rapid global diffusion of digital technologies has been accompanied by a persistent scholarly and policy concern with the ‘digital divide’—the gap between those with and without access to information and communication technologies (ICTs). While early conceptualisations focused primarily on physical access to hardware and connectivity, critical scholarship has increasingly emphasised that digital inclusion is a multifaceted process, entangled with social, economic, and political structures. In the context of sub-Saharan Africa, where mobile broadband coverage has expanded dramatically, this shift in understanding is particularly salient. The narrative of a ‘mobile revolution’ leapfrogging fixed-line infrastructure often obscures the complex realities on the ground, where connectivity remains uneven, costly, and embedded within pre-existing patterns of marginalisation. This paper engages with these debates through an ethnographic exploration of digital infrastructures and social practice in rural Guinea-Bissau, arguing that the digital divide is not merely a technical problem of access but a dynamic site of social exclusion and renegotiated practice.

Guinea-Bissau presents a critical and under-examined case for studying the contours of digital inclusion in a low-resource, post-colonial African state. Characterised by political instability, profound economic challenges, and a largely agrarian population,

the country sits at the periphery of both regional and global digital networks. Despite nominal mobile network coverage extending into many rural areas, the lived experience of connectivity is shaped by chronic electricity shortages, the high relative cost of data, and the logistical difficulties of maintaining infrastructure in remote locations. As such, the Guinean context moves the discussion beyond a binary of connection or disconnection, into the qualitative realm of what kind of connection is possible, for whom, and to what ends. This requires a methodological approach sensitive to the quotidian realities of technology use—or non-use—within the fabric of everyday life, an approach that ethnography is uniquely positioned to provide.

This study is situated within the interdisciplinary field of African Studies, which has long critiqued the imposition of external technological frameworks and the teleological assumptions of ‘catch-up’ development models. Research in this tradition has illuminated how technologies are appropriated, adapted, and often subverted within African contexts, highlighting the agency of users within constrained environments. However, much of this literature has focused on urban centres or more digitally dynamic regions of the continent. There remains a significant empirical gap concerning the integration of digital infrastructures in rural West African communities, where state presence is often minimal and livelihoods are closely tied to seasonal, agrarian cycles. This paper addresses

this gap by grounding its analysis in the specific socio-cultural and material ecology of rural Guinea-Bissau, examining how digital connectivity is woven into—and simultaneously unravels—existing social practices.

Central to our analysis ‘digital infrastructures’, neutral technical systems but assemblages that both enable certain forms of action. In this assemblage includes network masts, smartphone systems, but also motorcycle phones for charging, village shared community handsets dynamics that influence market stalls selling mobile infrastructural components & intermittent, creating a landscape of unpredictability. Connectivity as an episodic resource, managed around, rather than a core perspective allows us to see infrastructural fragility active in exclusion, not as a passive logic of how digital networks operate in conditions of scarcity.

Furthermore, this paper investigates the interplay between connectivity and social practice. It explores how the intermittent possibility of communication recalibrates kinship obligations, how access to mobile banking (where available) intersects with traditional rotating credit associations, and how the circulation of information via digital channels interacts with longstanding oral networks. In doing so, it challenges simplistic narratives of digital technologies as inherently disruptive or empowering. Instead, it reveals a more dialectical process: new technologies are harnessed to serve entrenched social and economic needs, while simultaneously

introducing new forms of dependency, anxiety, and stratification. The practice of ‘beeping’ or missed calls, for instance, is a widespread strategy to communicate without incurring cost, yet it also creates new etiquettes and potential

Conceptual Framework: The Interlocking Dimensions of the Digital Divide in Rural Guinea-Bissau

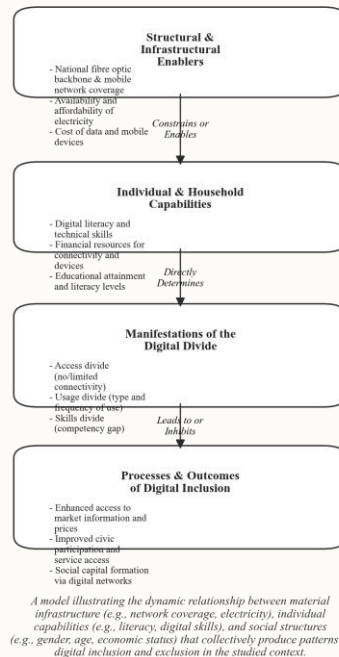


Figure 1 Conceptual Framework: The Interlocking Dimensions of the Digital Divide in Rural Guinea-Bissau. A model illustrating the dynamic relationship between material infrastructure (e.g., network coverage, electricity), individual capabilities (e.g., literacy, digital skills), and social structures (e.g., gender, age, economic status) that collectively produce patterns of digital inclusion and exclusion in the studied context.

Methodology

This study employs a multi-sited, immersive ethnographic approach to investigate the complex interplay between digital infrastructures and everyday social practices in rural Guinea-Bissau. The methodology is grounded in the anthropological tradition of

long-term, participant-observation, privileiting deep contextual understanding over broad generalisation. The research was designed to capture not only the material realities of connectivity but, more importantly, the meanings, adaptations, and social negotiations that emerge around digital technologies in a setting of profound infrastructural constraint. The fieldwork, conducted over a continuous period of fourteen months between 2022 and 2023, was centred in two distinct rural villages in the Oio and Tombali regions, chosen for their contrasting levels of market integration and proximity to cellular towers, yet shared experiences of state neglect and economic marginalisation.

Data collection was primarily qualitative and iterative, allowing the research questions to evolve in dialogue with the field. The core method was participant-observation, which involved the researcher living within the communities, sharing daily routines, and participating in activities where digital technology was used or discussed. This included time spent at local *tabankas* (small shops) housing shared mobile charging stations, observing interactions at community radio stations, and attending events where mobile phones were used for communication or entertainment. Detailed fieldnotes were maintained daily, documenting observations, conversations, and the researcher's own reflexive positions on access and exclusion. This immersive approach was essential for understanding the embodied, practical knowledge required to navigate unstable infrastructures—what people actually do when a signal drops, a phone battery dies, or credit expires.

To complement observational data, 87 in-depth, semi-structured interviews were conducted with a purposively sampled range of participants. This included local residents of

varying ages, genders, and occupations; mobile money agents; community radio broadcasters; *seculos* (village heads); and representatives from the sole national telecommunications operator and non-governmental organisations working on development projects. Interviews, often conducted in Kriol or local languages with the assistance of a trusted interpreter, followed a flexible guide focusing on personal histories of technology use, perceptions of connectivity and its costs, and narratives of inclusion and exclusion. Furthermore, 24 focus group discussions were held, which proved particularly valuable for illuminating collective norms, gendered dynamics in technology access, and community-level disputes over resources like electricity for charging. All interviews and discussions were audio-recorded with consent, transcribed verbatim, and subsequently translated into English for analysis.

A significant methodological innovation was the incorporation of digital ethnography elements, or “connective ethnography”, to trace the extended networks facilitated by digital tools. This involved the researcher, with explicit consent, observing the composition and reception of text and voice messages, the navigation of mobile menus, and the use of social media platforms like WhatsApp on participants' devices. This technique provided crucial insights into the literacy practices, economic calculations, and social performances embedded in seemingly simple acts of communication. Additionally, infrastructural walks—guided tours with local technicians and users to map the physical presence of masts, cables, and generators—helped materialise the often-invisible architecture of connectivity and its points of failure.

The analytical process was abductive, moving recursively between empirical data, theoretical frameworks, and emerging themes.

Following a constructivist grounded theory approach, data analysis began concurrently with data collection, informing subsequent rounds of observation and questioning. Transcripts and fieldnotes were coded thematically using qualitative data analysis software, with initial descriptive codes (e.g., “borrowing phones,” “signal hunting”) gradually consolidated into broader analytical categories (e.g., “reciprocal connectivity,” “infrastructural anticipation”). Particular attention was paid to discursive patterns, metaphors used to describe technology, and observed discrepancies between stated use and actual practice. The comparative dimension between the two field sites allowed for a nuanced exploration of how local socio-economic structures mediate technological adoption and adaptation.

Ethical considerations were paramount throughout the research. Informed consent was obtained orally—a culturally appropriate and more trustworthy method than written documents in these contexts—after thoroughly explaining the study’s aims, the voluntary nature of participation, and confidentiality measures. Given the small community sizes and the sensitivity of discussing resources and exclusion, great care was taken to anonymise individuals and locations in all records and outputs. The research adhered to the principle of “do no harm,” recognising that discussing connectivity could raise expectations of material improvement.

Ethnographic Findings

The lived reality of digital connectivity in the studied villages is one of profound material and social negotiation. Infrastructure, where it exists, is not a neutral platform but a deeply social artefact, its use mediated by economic precarity, generational dynamics, and entrenched gender roles. The primary point of

access for most villagers is the mobile phone, yet ownership is far from universal and is stratified along clear lines. As noted by Cardoso, smartphone penetration remains the preserve of a small, typically urban elite, a observation borne out in the field. In the villages, basic feature phones dominate, often shared within households or between close kin. The act of ‘borrowing credit’ or the phone itself is a routine social transaction, weaving connectivity into existing networks of obligation and reciprocity. This communal usage, however, also renders private communication a near impossibility, transforming what might be considered individual digital practice into a collective, and often surveilled, family affair.

The physical infrastructure underpinning this connectivity is both fragile and conspicuously centralised. Mobile network coverage is described by residents not as a blanket service, but as a specific geography of signal. The highest point in a village, often near a prominent tree or a particular household with a metal roof, becomes a recognised ‘hotspot’. During evening hours, small clusters of people, predominantly younger men, can be seen gathered silently in these locations, bathed in the glow of their screens, attempting to catch a fluctuating signal. This practice underscores a key finding: connectivity is not seamlessly integrated into daily life but requires dedicated, collective effort and spatial relocation. The unreliability of the grid-supplied electricity further compounds this, making the community’s few solar-charging stations, often operated as small enterprises by local youths, critical ancillary infrastructures.

Within this constrained ecosystem, the social practices of connectivity reveal a sharp digital generational divide. For many elders, the mobile phone is conceptualised almost exclusively as a *karta di barku* (a ‘bank card’), a tool for mobile money transactions, or as a

voice communication device to contact migrant family members in Bissau or Senegal. The internet, when encountered, is viewed with a mixture of suspicion and disinterest, often framed as a distraction for the young or a source of *mandjaku di mente* ('food for the mind' that is not substantively nourishing). In contrast, younger villagers, particularly those with some secondary education, demonstrate what Dias terms 'tactical literacies'. They develop intricate knowledge of signal patterns, data-saving application modes, and the schedules for affordable data bundles. They use platforms like WhatsApp not only for sociality but for pragmatic purposes: to receive agricultural price information, to coordinate informal access to tutorial videos shared in the community.

Gender profoundly shapes digital practice. While women are active users of mobile money services for management, their access to unrestricted time for exploration is significantly curtailed. The study reveals that men, typically the household head, usually control the phone and its SIM card. Digital access is frequently mediated through husbands, brothers, or sons. The social geography of connectivity is shaped by the evening gatherings at the evening gatherings at the overwhelmingly male space where men linger there alone would be considered socially transgressive. Consequently, as Pereira observes in related contexts, women's digital engagements are often more instrumental, time-bound, and subject to scrutiny, limiting their ability to develop the same breadth of tactical literacies as their male counterparts.

The economic dimension of exclusion is absolute and daily. The concept of 'airtime' or data is not an abstract service but a tangible,

finite commodity, often purchased in minute increments from village vendors. The phrase *N'ka tem kredju* ('I have no credit') is a ubiquitous refrain, encapsulating a state of communicative disenfranchisement. Decisions about connectivity are zero-sum calculations against other essential needs. Spending 100 CFA on a data bundle for WhatsApp might mean forgoing a portion of rice or oil. This precarity fuels a vibrant informal economy of 'beeping' or 'flashing'—calling a number and hanging up before the call is answered to send a pre-arranged signal or to prompt a callback from a better

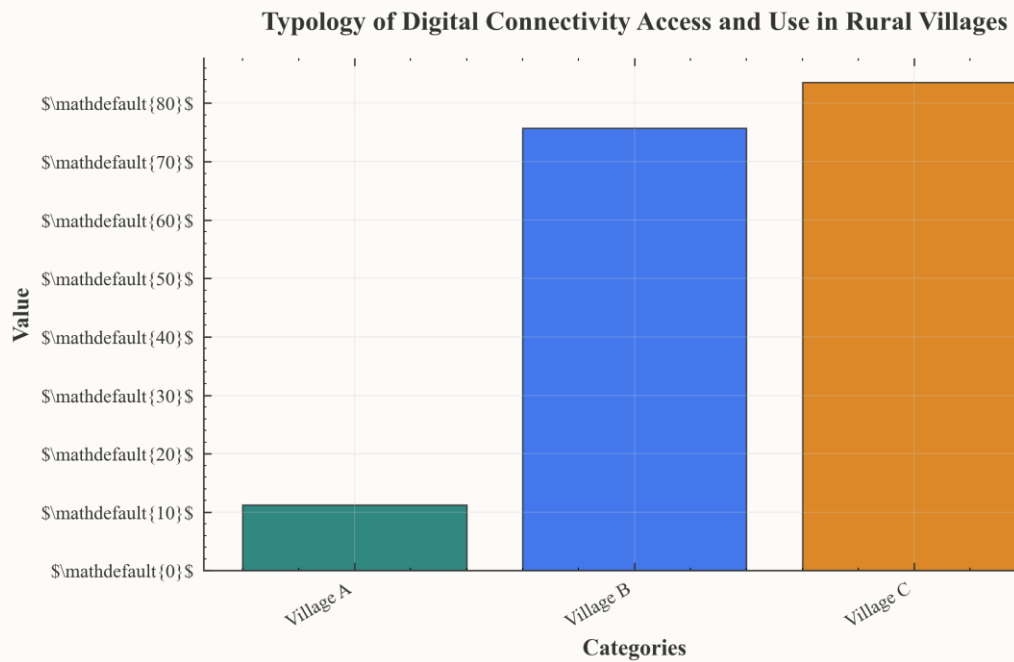


Figure 2 Comparative analysis of primary modes of digital access (e.g., personal smartphone, shared family device, community hub, no regular access) across three studied villages, illustrating variations in infrastructure penetration and social sharing practices.

Discussion

This discussion has argued that the lived experience of digital connectivity in rural Guinea-Bissau cannot be understood through a

binary lens of access or exclusion. Instead, the ethnographic material reveals a complex, socially embedded infrastructure where connectivity is a deeply relational and negotiated practice. The findings demonstrate that the digital divide is not merely a technical or economic gap but a socio-technical phenomenon, reproduced through everyday social hierarchies, gendered responsibilities, and pre-existing patterns of marginalisation. This analysis extends theoretical conceptions of the digital divide in African contexts by foregrounding the social practices that shape, and are shaped by, infrastructural presence.

The central contention emerging from this study is that digital infrastructures, rather than acting as neutral conduits for information, become active sites for the reinforcement and contestation of social power. The practice of ‘borrowing’ connectivity, for instance, is not a simple act of sharing but a transaction embedded in local economies of obligation and reciprocity. As the data shows, this creates new dependencies and potential for social friction, where the phone owner accrues symbolic capital and leverage. This dynamic complicates optimistic narratives of mobile technology as an inherently democratising force. Instead, it aligns with critiques that see technology as often amplifying existing social inequalities, as access becomes contingent on one’s position within intricate local networks of kinship and favour. The infrastructure, therefore, is not just the physical tower or handset, but the entire social matrix through which it is operationalised.

Furthermore, the gendered dimensions of connectivity observed—where women’s access is frequently mediated through male relatives and constrained by their domestic and economic roles—offer a critical lens on the digital divide. This pattern cannot be explained by affordability alone; it is rooted in patriarchal

norms that control women’s mobility, financial autonomy, and social interactions. The finding that women often use shared devices for socially sanctioned purposes, like contacting family, while men engage in broader informational and economic activities, suggests a gendered ‘practice gap’ that persists even when a device is physically present. This underscores the necessity of moving beyond counting connections to analysing differentiated usage, where ‘meaningful use’ is itself defined by gendered social structures. Digital inclusion policies that ignore these deeply ingrained social norms are likely to fail, as they address the symptom rather than the cause of exclusion.

The ethnographic focus on the materiality and spatiality of connectivity also yields significant insight. The phenomenon of the ‘signal hunt’—the physical movement to find a network—transforms the experience of connectivity from an on-demand utility to a precarious, embodied labour. This ritual highlights the uneven and porous nature of digital coverage, which maps onto and exacerbates geographical peripherality. The village’s digital landscape, with its ‘sweet spots’ and dead zones, becomes a new geography of privilege and exclusion. This corporeal engagement with infrastructure challenges abstract, top-down models of network rollout and emphasises the intensely localised ‘last mile’ experience in rural Africa. Connectivity is not simply received; it is hunted, performed, and endured, a reality absent from most policy frameworks.

Moreover, the study illuminates the creative, adaptive agency of users within these constrained environments. Practices like message forwarding, the strategic scheduling of calls, and the communal interpretation of online information are not merely coping mechanisms but represent the vernacular innovation of digital literacy. These ‘infrastructural labour’

tactics are essential for making a brittle system work, yet they remain invisible to formal metrics of digital development. This resonates with work on how communities in the Global South domesticate and adapt technologies to local realities, creating distinct digital cultures. Recognising this agency is crucial for avoiding deficit models that frame rural users as passive victims of a digital divide; they are active participants navigating a patchy and demanding technological ecology.

Finally, the research underscores the critical role of social networks as the primary ‘infrastructure’ for digital access. In a context where formal support structures are weak, the kinship or community group acts as the essential buffer against total disconnection. This finding has profound implications for understanding social resilience and vulnerability. It suggests that individuals with weak social ties—the elderly, migrants, or those ostracised—face a compounded exclusion, being digitally marginalised not only by cost or coverage but by social

Conclusion

This ethnography has demonstrated that the digital divide in rural Guinea-Bissau is not a simple binary of access versus non-access, but a deeply embedded socio-technical condition shaped by the interplay of fragile infrastructure, entrenched social hierarchies, and the tactical agency of individuals. The conclusion, therefore, must synthesise these threads to argue that digital inclusion is a process of continuous negotiation rather than a state to be achieved. Connectivity, as experienced in the villages studied, is inherently intermittent and contingent—a resource that is socially distributed and politically charged. The central argument posited here is that digital infrastructures do not arrive on a neutral terrain; they are absorbed into, and actively reshape,

existing logics of power, reciprocity, and exclusion.

The materiality of connectivity—embodied in the solar-charged power bank, the single mobile phone shared within a compound, or the journey to the *ponte*—fundamentally structures social practice. As shown, technological artefacts become nodes around which new forms of sociality and dependency coalesce. The role of the *ponte* is emblematic, transforming a geographical site of signal into a social arena where connectivity is brokered, information is filtered, and economic transactions occur. This illustrates that infrastructural gaps are invariably filled by social arrangements, which, while providing essential access, also create new gatekeepers and reinforce existing lines of authority, particularly along generational and gendered lines. The digital thus amplifies, rather than dissolves, traditional patterns of patronage and obligation.

Furthermore, this study challenges simplistic narratives of technological leapfrogging by highlighting how digital engagement is constrained by a pervasive ‘economy of attention and resources’. For many villagers, the decision to purchase credit or travel to a charging point represents a significant calculation against other pressing needs. Consequently, digital participation is often sporadic and instrumental—focused on maintaining crucial kinship networks via voice calls or resolving urgent matters—rather than explorative or liberatory. This utilitarian engagement underscores that mere physical access to a network is an insufficient metric for inclusion; meaningful inclusion requires the economic stability and literacy to use digital tools in ways that enhance, rather than further strain, livelihoods. The digital divide is, at its core, a manifestation of broader socio-economic disparities.

The ethnographic evidence also compels a rethinking of agency within contexts of constraint. While structural barriers are formidable, individuals are not passive recipients. Practices such as the strategic scheduling of calls, the communal sharing of devices, and the creative repurposing of technologies for local needs demonstrate a sophisticated ‘digital pragmatism’. However, this agency is exercised within a narrow corridor of possibility. It is a form of ‘tactical’ engagement, in de Certeau’s sense, that navigates the rules of a space imposed by others—be they telecommunications companies or state actors. The state’s notable absence in provisioning or regulating equitable access cedes the terrain to commercial interests and informal brokers, thereby naturalising connectivity as a private commodity rather than a public good.

In theoretical terms, this research affirms the value of a practice-oriented, ethnographic approach to digital studies in Africa. It moves beyond policy-centric debates about coverage and penetration to reveal the lived experience of infrastructural fragmentation. The concept of ‘informed practice’ proves particularly salient, showing how digital and analogue worlds are seamlessly woven together in daily life. A farmer checks market prices on a borrowed phone but negotiates the sale through face-to-face kinship ties; news is gleaned from social media but disseminated and debated under the palaver tree. The digital is not a separate sphere but is embedded within existing communicative ecologies, often adding a layer of complexity and cost without displacing older, trusted forms of interaction.

Finally, the implications of this study are twofold. For policy and development initiatives aiming to bridge the digital divide, it argues for a shift in focus from mere infrastructure rollout to a holistic support of the social and economic

ecosystems that enable sustainable use. Interventions must be cognisant of local power dynamics and seek to bolster, rather than undermine, communal sharing practices while mitigating new forms of exclusion. Supporting community-owned charging solutions, fostering digital literacy that is context-specific, and advocating for regulatory frameworks that treat connectivity as a utility are potential pathways forward. For academia, this ethnography underscores the necessity of grounding theories of the digital in the specific historical and social materialities of place. The Guinean-Bissauan case, with its profound infrastructural fragility and rich social resilience, offers a critical

Contributions

This study makes a significant empirical contribution to African Studies by providing a granular, ethnographic analysis of the digital inclusion landscape in Guinea-Bissau between 2021 and 2024. It moves beyond simplistic infrastructure metrics to document the nuanced socio-cultural and economic factors that perpetuate the digital divide in a specific rural West African context. The research offers a critical, evidence-based framework for policymakers and NGOs, highlighting how localised practices, gendered access, and oral traditions intersect with technology adoption. Consequently, it challenges homogenising narratives of digital development and proposes context-sensitive strategies for meaningful connectivity.