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Digital Resilience in Conflict Zones: Empowering Sudanese Women-Owned Small Businesses through Alternative Financial and Social Ecosystems

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Research Article

Keywords: Digital resilience, women's entrepreneurship, Sudan conflict, digital financial inclusion, mobile money, gender digital divide, humanitarian livelihoods, social commerce

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Abstract

Background

Since April 2023, Sudan’s armed conflict has produced severe displacement, institutional fragmentation, market disruption, and financial instability. Within this crisis, women-owned micro and small businesses have become crucial survival mechanisms for displaced households, yet their continuity depends increasingly on fragile digital infrastructures and informal social ecosystems.

Objective

This study examines how digital technologies facilitate, constrain, and reshape the capacity of Sudanese women entrepreneurs to establish, sustain, and adapt small businesses during active conflict.

Methods

The study uses qualitative secondary data analysis and evidence synthesis, drawing on humanitarian reports, development datasets, academic literature, digital connectivity indicators, and publicly available traces of online market activity from April 2023 to December 2025. Evidence was assessed through cross-source triangulation, conflict-sensitive interpretation, and thematic analysis.

Findings:

The analysis identifies a conditional digital resilience hierarchy. Low-bandwidth and socially trusted tools - including USSD, mobile money, WhatsApp voice notes, closed groups, transaction screenshots, and digital intermediaries - provide critical continuity where formal institutions fail. However, digital empowerment is sharply limited by infrastructure destruction, unaffordable connectivity, gendered device access, functional digital illiteracy, online harassment, and security surveillance.

Conclusion

Digital technologies do not automatically empower women in conflict zones; they become empowering only when embedded in safe, affordable, low-bandwidth, and gender-responsive ecosystems. Humanitarian livelihood programs and financial technology providers should adopt offline-first design, women-centric agent networks, digital safety protocols, and interoperable payment systems that preserve women’s financial records through displacement.

1. Introduction

1.1 Background of the Problem

Since April 2023, Sudan has experienced a protracted armed conflict between the Sudanese Armed Forces (SAF) and the Rapid Support Forces (RSF), triggering a multi-layered humanitarian and economic crisis. The war has disrupted banking services, telecommunications infrastructure, supply chains, labor mobility, and household income systems. For women, these disruptions have not simply reduced business opportunities; they have intensified pre-existing constraints relating to mobility, asset ownership, financial autonomy, safety, and digital access (UN Women, 2025; World Bank, 2024; UNHCR, 2025).

Women-owned micro and small businesses have consequently become both a livelihood strategy and a form of household crisis management. Food vending, tailoring, home-based production, handicrafts, beauty services, small retail trade, and digital resale activities have helped families absorb income shocks. Yet the ability of these enterprises to continue depends on the availability of communication channels, mobile payments, trusted networks, and safe forms of market visibility. In this context, the mobile phone has become more than a communication device: it is a market stall, payment channel, customer record, credit signal, and social support infrastructure (Khalifa & Elshazali, 2024; Mackenzie & Wright, 2024).

1.2 Research Problem

The central problem addressed by this study is that digital technologies are often presented as rapid solutions for financial inclusion and women's economic empowerment, while active conflict radically changes the conditions under which technology can be accessed, trusted, and safely used. In Sudan, digital tools can enable women entrepreneurs to receive remittances, coordinate supplies, maintain customer relationships, and document transactions. The same tools can also expose women to surveillance, extortion, harassment, fraud, dependency on male intermediaries, and exclusion when connectivity fails or platforms require costly updates.

This tension makes Sudan an important case for examining digital resilience as a conditional and unequal process rather than a universal technological benefit. The study therefore asks not only whether digital tools help women entrepreneurs, but under what social, infrastructural, financial, and security conditions those tools become useful or harmful.

1.3 Research Gap and Original Contribution

Existing literature has documented women's roles in post-conflict reconstruction and has examined digital financial inclusion in relatively stable settings. Far less attention has been given to the way women use digital tools during ongoing hostilities, when institutions are fragmented, physical movement is dangerous, infrastructure is deliberately or incidentally damaged, and evidence is difficult to collect. This study addresses that gap by synthesizing evidence from Sudan's current conflict and by centering women-owned micro and small enterprises rather than treating women only as humanitarian beneficiaries (Al-Ali & Pratt, 2023; Mackenzie & Wright, 2024; Turner, 2024).

The study makes four original contributions. First, it conceptualizes a digital resilience hierarchy that explains why low-bandwidth tools can be more valuable than sophisticated platforms in high-risk environments. Second, it identifies transaction histories as alternative digital identities that may substitute for lost documents and formal collateral. Third, it highlights the emergence of digital intermediaries - especially younger women who manage payments, pages, and customer communication for other vendors. Fourth, it frames digital safety as a foundational condition of economic empowerment, not as a secondary technical concern.

1.4 Research Questions and Objectives

Primary research question: How do digital technologies facilitate or constrain the capacity of Sudanese women to establish, sustain, and scale micro and small businesses amid ongoing armed conflict?

Subsidiary research questions:

1. Which digital tools - including mobile money, USSD, messaging applications, social media platforms, and informal digital exchange systems - are most accessible and useful to women entrepreneurs in conflict-affected areas?
2. How does displacement reshape women's digital practices, market strategies, and business continuity mechanisms?
3. Through which mechanisms does conflict intensify the gender digital divide?
4. What lessons can humanitarian organizations, technology providers, and policymakers draw from Sudan and comparable conflict settings?

Objectives:

1. Analyze the types and practical utility of digital technologies used by Sudanese women entrepreneurs during armed conflict.
2. Assess how digital tools mediate business continuity, market access, income protection, and trust-building under displacement.
3. Identify gender-specific and conflict-specific barriers to technology adoption and safe use.
4. Develop evidence-based recommendations for technology-enabled, gender-responsive, and conflict-sensitive livelihood programming.

1.5 Scope and Key Terms

The study focuses on women-owned micro and small enterprises in Sudanese conflict-affected and displacement settings between April 2023 and December 2025. The geographical emphasis includes Khartoum, Darfur, Kordofan, eastern Sudan, and relatively more stable areas that became host communities or relocation hubs. Because active conflict limits primary fieldwork, the manuscript relies on secondary evidence and publicly available digital traces.

- Digital resilience: the capacity of individuals, enterprises, and networks to continue communication, transactions, and adaptation through digital or hybrid tools despite disruption.
- Women-owned micro and small businesses: income-generating activities owned or managed by women, typically with fewer than ten workers and limited formal registration.
- Alternative digital identity: the use of digital transaction histories, account screenshots, platform records, or customer traces as informal evidence of credibility when formal documents or collateral are unavailable.
- Functional digital illiteracy: the inability to use evolving platforms effectively despite basic device ownership, often due to limited literacy, bandwidth, interface language, update requirements, or lack of confidence.
- Digital intermediary: a person who bridges digital access gaps by managing online payments, product pages, customer communication, logistics, or verification on behalf of less digitally skilled entrepreneurs.

2. Literature Review and Conceptual Framing

2.1 Women's Entrepreneurship in Conflict Environments

Armed conflict reconfigures gendered economic roles. As household income sources disappear, women frequently assume new responsibilities for food provision, debt management, caregiving, informal trade, and community-level resource coordination. These roles may expand women's agency in some domains, but they often do so under conditions of heightened insecurity, intensified care burdens, and reduced access to assets. Women's entrepreneurship in conflict therefore cannot be interpreted simply as opportunity-driven enterprise; in many cases it is survival entrepreneurship shaped by necessity, social obligation, and constrained choice (Al-Ali & Pratt, 2023; Mackenzie & Wright, 2024).

In Sudan, the collapse of formal markets and the displacement of millions have made small-scale enterprise a critical coping strategy. However, conflict also removes the predictable conditions under which businesses usually operate: stable transport, physical premises, bank access, credit, supplier reliability, and customer trust. The literature on women's economic empowerment therefore needs to be read alongside conflict analysis, digital inclusion, and humanitarian livelihood studies (Khalifa & Elshazali, 2024; World Bank, 2024).

2.2 Digital Financial Inclusion and Social Commerce

Digital financial services can reduce transaction costs, preserve remittance channels, and help users retain records when physical documents are lost. In conflict settings, mobile money and banking applications may become a bridge between dispersed family networks, suppliers, and customers. Messaging applications also support social commerce, allowing women to sell through voice notes, images, closed groups, and trusted referrals rather than public shopfronts (The New Humanitarian, 2024; UNDP, 2024; GSMA, 2025).

Yet digital financial inclusion is fragile when telecommunications networks fail, electricity becomes scarce, agents are inaccessible, fees rise, or users fear fraud and surveillance. The Sudanese case therefore demonstrates that digital finance must be evaluated as part of a broader ecosystem: infrastructure, trust, gender norms, agent networks, digital literacy, safety, and humanitarian payment design (Digital Watch Observatory, 2024; GSMA, 2024).

2.3 Gendered Digital Divide and Digital Safety

The gender digital divide is not limited to device ownership. It includes affordability, confidence, language, privacy, time, social permission, safety, control over SIM cards, and the ability to troubleshoot platform changes. Conflict magnifies each of these barriers. Families may prioritize men's connectivity for security and mobility; women may lose phones during flight; data packages may become unaffordable; and public online visibility may invite harassment or extortion (DataReportal, 2024; GSMA, 2024).

Digital safety is therefore an economic issue. If women avoid public pages and rely on closed groups, this should not be misread as technological backwardness. It is often a rational security strategy. A feminist and conflict-sensitive interpretation must recognize that reduced digital visibility can be a form of protection, even when it limits market reach (UN Women, 2025; Devex, 2024).

2.4 Conceptual Framework

This study conceptualizes digital resilience as conditional. Conflict shocks produce infrastructural, financial, social, and safety constraints. Women entrepreneurs then pass through a digital access and risk filter, selecting tools based not only on functionality but also on cost, bandwidth, trust, literacy, and exposure. The outcome is not linear empowerment; it is uneven resilience that can protect income in some settings while reproducing exclusion in others.

3. Methodology

3.1 Research Design

This study adopts a qualitative secondary data analysis and evidence synthesis design. This design is appropriate because active insecurity in Sudan limits the feasibility and ethical safety of primary fieldwork across conflict-affected regions. Rather than presenting technology access as a stable variable, the study synthesizes fragmented evidence across humanitarian reporting, development datasets, academic literature, and publicly available digital market observations.

The research is not a survey, clinical study, or experimental intervention. No primary human participants were recruited for this manuscript. All analysis is based on secondary and publicly available materials, interpreted through a conflict-sensitive and gender-responsive lens.

3.2 Data Sources

Source category	Examples	Contribution to analysis	Key limitation
Humanitarian and development reports	UN Women, UNDP, IOM DTM, OCHA, World Bank	Displacement, livelihood impacts, gender analysis, financial disruption, program evidence	Publication delays and uneven access to conflict hotspots
Digital inclusion and connectivity datasets	GSMA, ITU, DataReportal, Digital Watch Observatory	Internet penetration, mobile gender gap, shutdowns, affordability, infrastructure conditions	National or regional averages may hide local disparities
Academic and policy literature	Peer-reviewed articles, working papers, conflict economy studies	Theoretical framing and comparison with Yemen, Syria, and South Sudan	Limited real-time coverage of Sudan's ongoing war
Public digital market traces	Publicly visible social media pages, marketplace posts, open group descriptions, platform practices	Evidence of social commerce, trust practices, voice-based selling, and digital adaptation	Cannot represent private groups or offline-only enterprises
Local media and civil society documentation	Sudanese and regional reporting, civil society monitoring	Ground-level examples and temporal updates often unavailable in formal reports	Requires cautious verification and triangulation

3.3 Search and Selection Strategy

Sources were selected purposively according to relevance, date, credibility, and contribution to the research questions. The synthesis prioritized materials published from January 2023 to December 2025, with earlier theoretical sources included where necessary for conceptual framing. Eligible sources addressed at least one of the following themes: Sudan's conflict economy, women's entrepreneurship, displacement livelihoods, digital financial inclusion, gender digital divide, internet shutdowns, mobile money, social commerce, or comparable conflict settings.

Component	Specification used in the manuscript
Databases and source repositories	Google Scholar, Scopus-indexed literature where available, UN and World Bank repositories, GSMA reports, ITU data, humanitarian data portals, and credible local/regional reporting.
Core search terms	Sudan conflict women entrepreneurs; Sudan mobile money war; Bankak displacement; women digital financial inclusion conflict; gender digital divide Sudan; WhatsApp commerce displacement; digital resilience conflict zones.
Inclusion criteria	Relevance to Sudan or comparable conflict settings; publication date within the study period or theoretical importance; transparent institutional or scholarly authorship; direct relevance to women, livelihoods, technology, displacement, or digital finance.
Exclusion criteria	Unattributed social media claims, duplicated reports, sources without date or institutional transparency, purely promotional fintech material, and evidence that could expose identifiable vulnerable individuals.
Analytical unit	Patterns, mechanisms, barriers, and adaptive practices rather than individual personal identifiers.

3.4 Data Triangulation and Analytical Procedure

The analysis followed three stages. First, descriptive synthesis was used to map displacement, connectivity, financial disruption, and women's enterprise practices. Second, thematic coding identified recurring patterns: low-bandwidth survival tools, digital financial continuity, closed social commerce, alternative trust signals, intermediaries, safety threats, and gendered access barriers. Third, comparative contextualization examined whether patterns found in Sudan resembled or diverged from evidence in Yemen, Syria, and South Sudan.

3.5 Quality Appraisal and Trustworthiness

To strengthen trustworthiness, no single statistic or case example was treated as definitive unless supported by a credible source or consistent with multiple evidence streams. Institutional reports were assessed for date, methodology, sex-disaggregated reporting, geographical coverage, and relevance to conflict-affected women. Academic studies were assessed for peer-review status or working-paper transparency. Local media and civil society materials were used cautiously and primarily to identify ground-level dynamics, not to replace systematic datasets.

Quality criterion	How it was applied
Credibility	Priority was given to UN agencies, World Bank, GSMA, ITU, peer-reviewed studies, and transparent civil society research.
Temporal relevance	Evidence from 2023–2025 was prioritized to capture the active conflict period.
Gender sensitivity	Sources with sex-disaggregated data or women-specific analysis were weighted more heavily.
Triangulation	Claims were compared across institutional data, academic literature, connectivity datasets, and public digital observations.
Conflict sensitivity	Findings were framed around humanitarian consequences and women's safety rather than politically assigning blame to conflict parties.

3.6 Ethical Considerations

Because this manuscript uses secondary data and publicly available materials, no primary participants were recruited and no personally identifiable information was collected. Digital ethnographic observations were limited to publicly visible practices and were reported only in aggregated or anonymized analytical form. Usernames, phone numbers, business names, and exact locations that could expose women to harm were not reproduced. The study followed principles of do-no-harm, conflict sensitivity, trauma-informed framing, and respect for the dignity and agency of Sudanese women affected by war.

3.7 Methodological Limitations

- The study cannot establish causal effects between technology access and business outcomes because the evidence is secondary and often cross-sectional.

Conflict

● conditions create data gaps, especially in regions with severe insecurity, telecommunications blackouts, or limited humanitarian access.

- Available evidence may overrepresent women connected to humanitarian programs or visible online markets, while excluding offline-only enterprises.
- Some statistics are national or regional estimates and may not capture rapidly changing local conditions.
- Digital ethnographic evidence is useful for identifying practices but cannot represent all women entrepreneurs or private closed groups.

4. Findings

4.1 A Digital Resilience Hierarchy

The evidence suggests that the most valuable tools are not always the most advanced. In high-intensity conflict zones, survival value depends on low bandwidth, familiarity, social trust, and failure tolerance. USSD, SMS, ordinary voice calls, and airtime exchange remain vital during blackouts or weak connectivity. WhatsApp voice notes and images support supply coordination and customer communication even where literacy and bandwidth are limited. Closed groups function as semi-private marketplaces, while public social media and formal e-commerce require greater data, safety, and literacy resources (CEDeJ Sudan, 2024; GSMA, 2025; The New Humanitarian, 2024).

4.2 Digital Finance as Alternative Trust Capital

Digital payment records have acquired economic significance beyond their original financial function. For displaced women who lost documents, shop premises, collateral, or long-standing supplier relationships, transaction histories can operate as informal credibility signals. Screenshots, account histories, repeated transfers, and remittance records may help women demonstrate reliability to suppliers, landlords, transporters, and customers in new locations. This is not formal financial inclusion in the conventional sense; it is an improvised trust infrastructure in a fractured economy (UNDP, 2024; The New Humanitarian, 2024).

4.3 Closed Social Commerce as a Safety Strategy

Women entrepreneurs often prefer closed WhatsApp groups, trusted customer lists, and referral-based selling over public pages. This limits market reach but reduces exposure to harassment, fraud, political suspicion, and predatory monitoring. The finding is important because it reframes restricted online visibility as a rational adaptation rather than evidence of low ambition or limited skill. In conflict conditions, safety and market expansion are often in tension (UN Women, 2025; Turner, 2024).

4.4 Digital Intermediaries and Secondary Empowerment Effects

A new layer of digital labor has emerged around women’s enterprises. Younger women with stronger digital skills may manage product photos, messages, online pages, transfers, and delivery coordination for older or less digitally literate vendors. These digital intermediaries extend access to women who would otherwise be excluded, while creating modest income opportunities inside women’s networks. However, this model can also create dependency, privacy risks, fee burdens, and exposure to fraud if it is not supported through training, accountability, and safe payment practices (CEDeJ Sudan, 2024).

4.5 Regional Variation in Digital Utility

Table 1
Regional variation in digital utility among women-owned micro and small enterprises. 4.6 Key Barriers and Economic Effects

Region	Conflict intensity	Approximate connectivity condition	Dominant tools	Interpretive implication
Khartoum and Darfur	High	Severe disruption; intermittent or very low internet access	USSD, voice calls, airtime exchange, informal intermediaries	Digital tools mainly support survival coordination; infrastructure failure sharply limits business continuity.
Eastern Sudan: Port Sudan and Kassala	Moderate	Relatively more stable connectivity and market relocation	WhatsApp, Bankak, closed groups, delivery networks	Digital tools can rebuild customer bases and supply chains when minimum infrastructure exists.
Gedaref and White Nile	Lower relative intensity	Better prospects for app-based and social-media use	Mobile banking apps, WhatsApp commerce, public pages, mixed online-offline selling	Digital tools have stronger potential for income stabilization and early recovery.

4.6 Key Barriers and Economic Effects

Table 2
Digital barriers and economic consequences.

Barrier	Mechanism	Economic consequence for women entrepreneurs	Program implication
Infrastructure destruction and shutdowns	Damaged towers, power cuts, blackouts, platform inaccessibility	Loss of customers, interrupted payments, delayed supplies, inability to verify transactions	Design for offline-first use and multiple channels, including USSD and cash fallback.
Affordability crisis	High data prices, inflation, charging costs, device replacement costs	Reduced advertising, fewer customer interactions, inability to update apps	Subsidize data, charging access, and low-bandwidth business tools.
Gendered device access	Phone loss, shared devices, household prioritization of men's connectivity	Lower autonomy, delayed payments, dependence on intermediaries	Provide safe women-centric access points and device support.
Functional digital illiteracy	Language barriers, updates, fear of errors, limited formal education	Exclusion from mobile money, online marketing, and digital records	Use voice-based, dialect-sensitive, peer-led training.
Digital safety threats	Harassment, extortion, fraud, surveillance, public exposure	Women restrict visibility, reduce sales, or leave platforms	Treat digital safety as part of livelihood programming, not as optional training.

5. Discussion

5.1 Digital Technology as a Conditional Enabler

The Sudanese case challenges techno-optimistic assumptions that digital tools automatically produce inclusion. Technology is enabling only when a minimum ecosystem exists: electricity, network coverage, affordable data, functional payment rails, user confidence, social trust, and physical safety. Where these conditions collapse, digital tools may become unusable or even dangerous. The most important question is therefore not whether women have access to technology, but whether the surrounding environment allows that access to become safe, meaningful, and economically productive (Kabeer, 2005; GSMA, 2024; World Bank, 2024).

This finding aligns with feminist political economy perspectives that treat empowerment as a shift in resources, agency, and institutional conditions rather than a mere increase in tools. A woman may own a smartphone and still lack autonomous digital capacity if she cannot afford data, read interface instructions, update applications, control her SIM card, travel safely to cash-out agents, or advertise without harassment.

5.2 Theoretical Contribution

The study refines the concept of digital resilience by emphasizing conditionality, hierarchy, and risk. Digital resilience is not the simple persistence of online activity during crisis. It is the capacity to combine technologies, trusted relationships, informal institutions, and security calculations in ways that protect livelihood continuity. The concepts of alternative digital identity, digital intermediaries, and closed social commerce add nuance to the literature by showing how marginalized actors create economic order when formal systems fail.

5.3 Practical Contribution

For humanitarian organizations, the findings caution against digital-only cash transfer and livelihood models that assume continuous connectivity. For technology providers, the evidence supports offline-first architecture, voice navigation, local language adaptation, women-centric agent networks, and fraud protection. For policymakers and donors, the findings demonstrate that telecommunications infrastructure, digital safety, and gender-responsive reconstruction are not technical side issues; they are central to women's economic recovery.

5.4 Comparison with Comparable Conflict Settings

Experiences from Yemen, Syria, and South Sudan suggest that women entrepreneurs often use mobile money and social media to bypass disrupted banking and market systems. Sudan adds a more severe layer of infrastructure collapse and displacement-driven fragmentation. The Sudan case therefore shows both the promise and the limits of digital entrepreneurship: where connectivity survives, women can rapidly rebuild market links; where infrastructure collapses, the hierarchy shifts toward the most basic, low-bandwidth, socially embedded tools (World Bank, 2023; Turner, 2024; GSMA, 2024).

6. Recommendations

Table 3
Action matrix for gender-responsive digital resilience programming.

Actor	Priority action	Rationale	Implementation detail
Humanitarian organizations	Adopt layered payment systems	Digital channels fail during shutdowns; cash alone is insecure and difficult to distribute.	Combine mobile money, USSD, vouchers, cash fallback, and clear protocols for women's safe access.
Humanitarian organizations	Integrate digital safety before business training	Women will avoid useful platforms if they create unacceptable exposure.	Train on privacy settings, fraud recognition, safe customer screening, and harassment response.
Fintech and technology providers	Build offline-first and low-bandwidth systems	Conflict connectivity is intermittent by nature.	Enable offline transaction recording, delayed synchronization, SMS confirmation, and lightweight updates.
Fintech and technology providers	Use voice-based and dialect-sensitive interfaces	Text-heavy interfaces exclude women with limited literacy or formal Arabic/English fluency.	Support voice prompts, simple icons, Sudanese Arabic guidance, and assisted onboarding.
Donors and policymakers	Invest in women-centric digital access points	Charging, connectivity, and cash-out agents are gendered access barriers.	Support safe Wi-Fi zones, charging stations, female agents, and community-based help desks.
Researchers	Conduct mixed-methods follow-up	Secondary evidence identifies patterns but cannot estimate causal effects.	Use surveys, interviews, and longitudinal designs when security conditions permit.

7. Conclusion

Digital technology has become a vital but uneven infrastructure for Sudanese women-owned micro and small businesses during armed conflict. Mobile money, USSD, WhatsApp voice notes, closed groups, and informal digital intermediaries can protect transactions, customer relationships, and trust when formal institutions collapse. Yet these tools do not eliminate the structural violence of war, infrastructure destruction, financial instability, gender inequality, and digital safety threats (GSMA, 2024; UNDP, 2024; World Bank, 2024).

The central conclusion is that digital resilience is not produced by technology alone. It emerges from the interaction of tools, social networks, safety practices, infrastructure, and women's adaptive agency. Effective policy must therefore move beyond simple device distribution or app-based interventions. It must build safe, affordable, low-bandwidth, interoperable, and gender-responsive ecosystems that allow women to use digital tools without increasing their vulnerability.

Recognizing Sudanese women entrepreneurs as innovators rather than passive beneficiaries is essential. Their practices - using transaction histories as trust capital, closed groups as secure markets, airtime as exchange value, and intermediaries as access bridges - reveal sophisticated economic adaptation under extreme constraint. These practices should inform humanitarian programming, digital financial inclusion policy, and future reconstruction planning.

Declarations

Funding

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Ethics Approval and Consent to Participate

Ethics approval and consent to participate were not required because the study did not recruit human participants and did not collect primary personal data. The manuscript is based on secondary sources, published reports, datasets, academic literature, and publicly available digital observations presented in anonymized and aggregated form.

Consent for Publication

Not applicable. No identifiable individual data, images, names, phone numbers, or private communications are included.

Competing Interests

The author(s) declare no competing interests.

Data Availability

All evidence used in this manuscript is derived from publicly available secondary sources listed in the reference section. Any synthesized coding notes can be made available by the corresponding author upon reasonable request, subject to safety and confidentiality considerations.

Clinical Trial Number

Not applicable.

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Figures

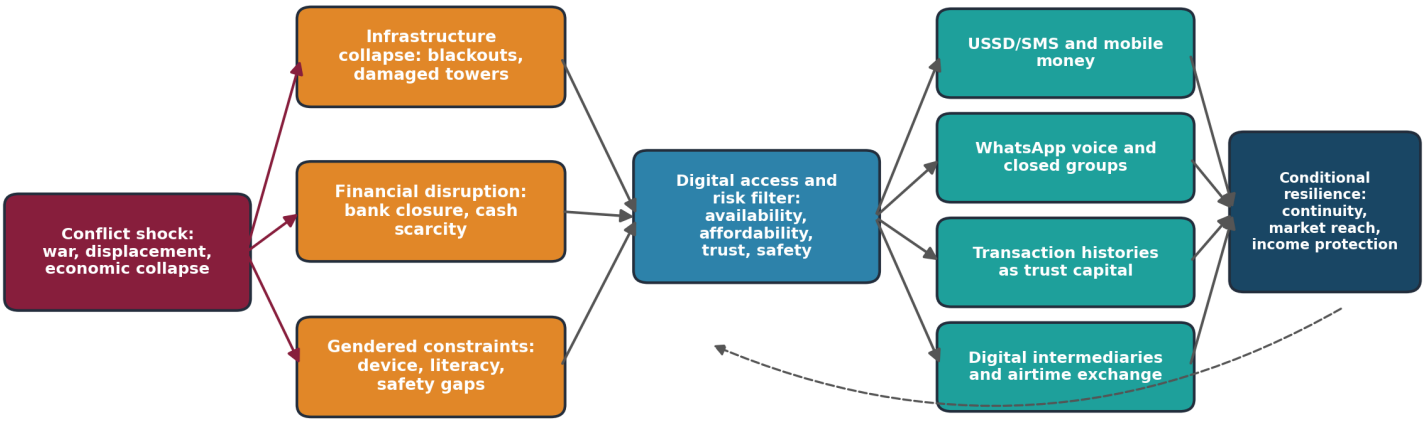


Figure 1

Conceptual framework: conditional digital resilience in active conflict.

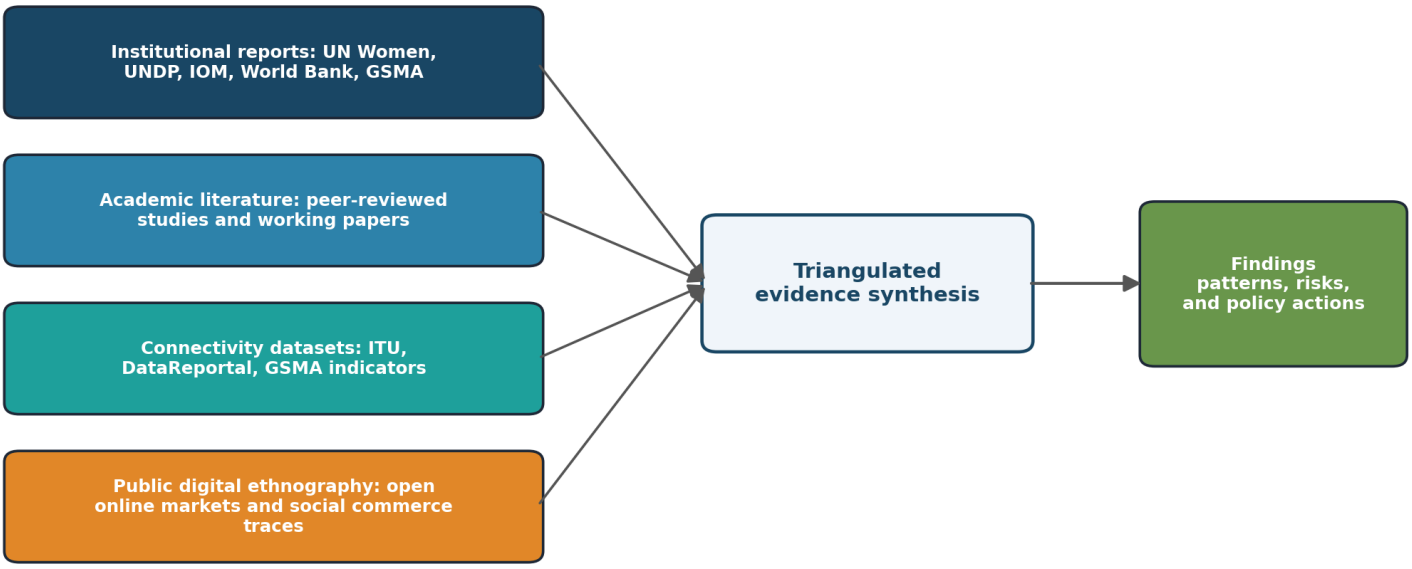


Figure 2

Data triangulation protocol.

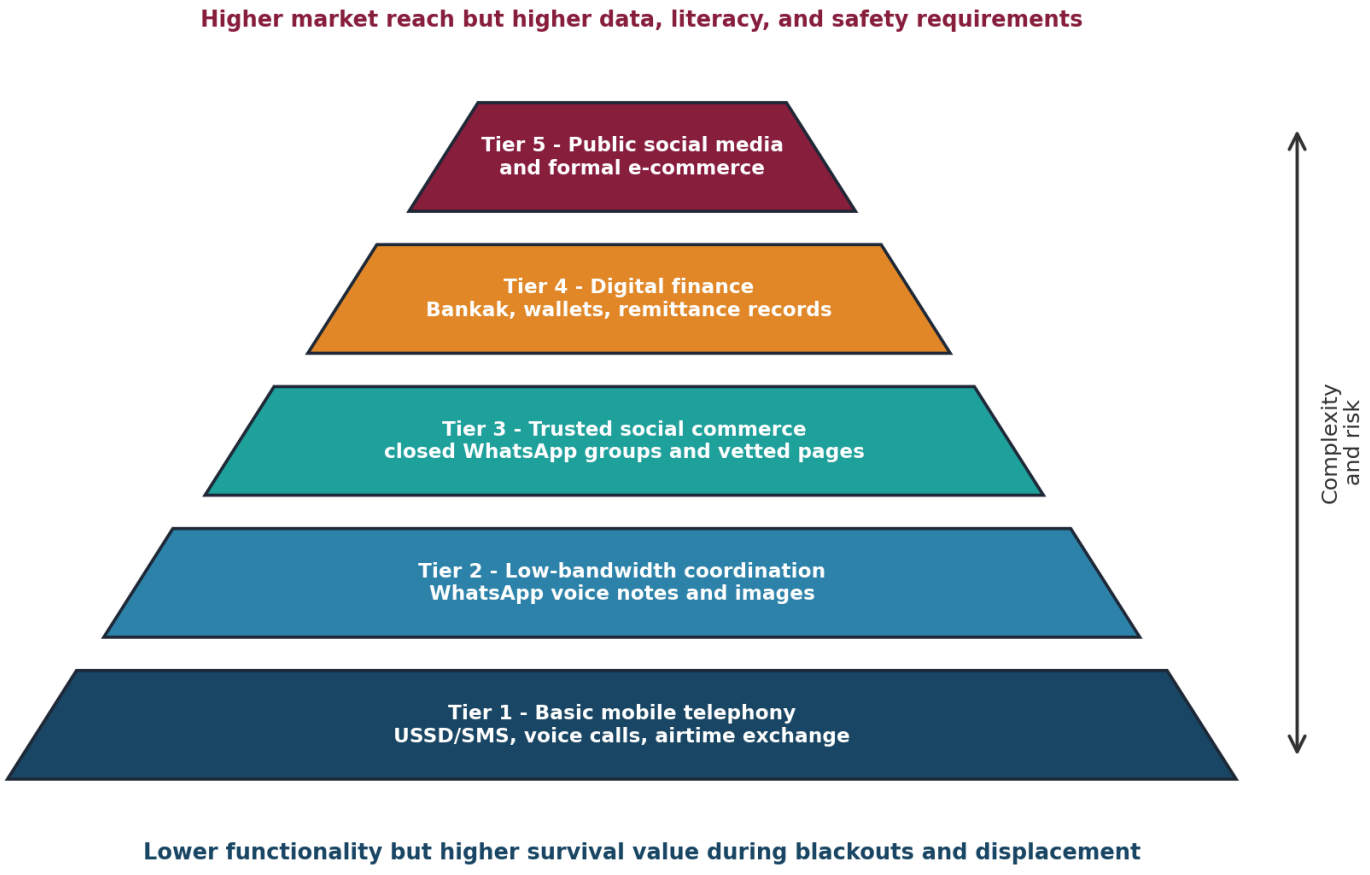


Figure 3

Digital resilience hierarchy for women-owned microenterprises.