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From Gloom to Bloom: Mobile Technology and Digital Identity as Pathways from Vulnerability to Empowerment: Social Protection Against Gender-Based Violence in Nigeria

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Abstract:

- ***Background:***

Gender-based violence (GBV) remains a pervasive human-rights and public-health problem, affecting an estimated one in three women globally, yet the mechanisms through which digital identity and mobile technologies shape survivors' access to social protection remain under-theorized, particularly in West African informal-economy settings.

- ***Objective:***

This study examined how access to mobile technology and digital identity is associated with reporting behaviour, perceived safety, well-being, exclusion and trust among women engaged in informal trade in Nigeria and identified the barriers that constrain the protective potential of digital tools.

- ***Methods:***

A convergent parallel mixed-methods design combined a cross-sectional structured survey (N = 318) with semi-structured interviews and focus group discussions among women trading at the Gwagwalada Market (Abuja) and the Orie-Ugba Market (Umuahia) between January and December 2025. Multi-item constructs (access, safety, physical/mental/social wellbeing, privacy, exclusion and trust) were assessed for reliability and validity (Cronbach's alpha, composite reliability, average variance extracted, heterotrait–monotrait ratio); Spearman's rank-order correlation examined bivariate associations. Qualitative data were analysed thematically and integrated with the quantitative findings during interpretation.

- ***Results:***

All constructs demonstrated acceptable-to-strong reliability (α = 0.81–0.84; composite reliability = 0.85–0.88) and convergent validity (AVE = 0.57–0.63). Mobile technology use correlated positively with access (rs = .30), safety (rs = .28), wellbeing (rs = .28), privacy (rs = .29) and trust (rs = .29), and negatively with exclusion (rs = -.23) (all p < .01). Exclusion was strongly and negatively associated with access, safety and well-being (rs = -.45 to -.51). Despite near-universal internet access (97.5%) and possession of a National Identification Number, 44% of respondents were unaware of existing social protection programmes. Qualitative accounts illustrated both the protective affordability of mobile money, secret alert applications and digital identity, and the risks of device confiscation, surveillance and technology-facilitated abuse.

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➢ ***Conclusion:***

Digital identity and mobile technologies can meaningfully advance women's transition from vulnerability ("gloom") to empowerment ("bloom") when embedded in survivor-centred, privacy-protective and gender-responsive design; unaddressed digital exclusion, however, risks reproducing the very vulnerabilities that social protection is intended to relieve.

Keywords: *Gender-Based Violence; Digital Identity; Mobile Technology; Social Protection; Women's Empowerment; Nigeria.*

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I. INTRODUCTION

Gender-based violence (GBV) is a pervasive and universally recognised violation of human rights that affects women and girls across every region, income level and social group, occurring disproportionately in silence and often going unreported (UNHCR, n.d.; World Health Organization [WHO], 2024). GBV is defined as violence directed at a person on the basis of sex or gender, encompassing the use of force, coercion, threats, deception, or cultural and economic pressure to compel action against a person's will (UNHCR, n.d.). It is not confined to isolated incidents but is embedded in everyday social and cultural practice, poverty and legal deficiency, and constitutes a persistent development challenge that undermines women's autonomy, economic participation, social inclusion and the attainment of the Sustainable Development Goals (Agu, Das, King, Agwu, & Mbachu, 2025; Katende-Kyenda & Ani, 2025).

The WHO (2024) estimates that approximately one in three women globally experience physical and/or sexual violence in their lifetime, with consequences that extend across physical safety, mental health, economic agency and inter generational well-being. In Nigeria, the Invictus Africa Womanity Index reports that roughly three in five respondents have either experienced GBV or know someone who has, with the majority of incidents occurring within the home, alongside markedly limited public budgetary allocation for GBV response (Invictus Africa, 2024). GBV also imposes measurable macroeconomic costs by constraining women's labour-force participation and deepening structural inequality (Agu et al., 2025; International Monetary Fund, African Department, 2024). The COVID-19 pandemic intensified these dynamics: prolonged household confinement, loss of income and disrupted support networks produced what the United Nations has termed a "shadow pandemic" of violence (Cookson, Fuentes, & Bitterly, 2025), a pattern corroborated by clinical and field observations in this study's own data collection sites.

Although GBV can affect any member of a household, women and girls remain disproportionately affected, with consequences that extend across families and communities (International Rescue Committee, 2023; Ezeaka & Bartholomew, 2025). Acts that cause or threaten physical, sexual, psychological or economic harm to women constitute a violation of human rights and a form of gender-based discrimination (Lewis, 2026; WHO, 2024).

Structural crises, economic shocks, conflict, and climate-related disasters consistently intensify pre-existing gender inequalities and amplify violence against women and girls (Given, 2025; UN Spotlight Initiative, 2025), underscoring a persistent connection between structural vulnerability, poverty and exposure to GBV.

Social protection mechanisms, cash transfers, insurance schemes and case-managed support are increasingly recognised as instruments for GBV prevention and response, yet their protective potential depends critically on accessibility, inclusiveness and timeliness (Al-Ahmadi, Heinemann, Mossman, & Rawlings, 2024; Lyles, Glass, Sidabutar, et al., 2025). In practice, identity documentation requirements, low awareness, stigma and ineffective reporting channels continue to constrain uptake, even where programmes and protective legislation exist (Ekeh, Apeh, Odionu, & Austin-Gabriel, 2025).

Against this backdrop, the rapid expansion of mobile technologies and digital ecosystems is reshaping the delivery of social protection. Governments across the Global South, including Nigeria, are digitising public service delivery through mobile financial systems, biometric identity infrastructure and interoperable social registries (Organisation for Economic Co-operation and Development [OECD], 2024; World Bank, 2025; Showkat, Bhat, & Baba, 2024). Mobile money, digital wallets and biometric authentication are now central to the distribution of social protection benefits (World Bank, 2024), extending financial autonomy to previously unbanked populations while simultaneously introducing new risks of surveillance, exclusion and technology-facilitated abuse (Lee-Ying, Tai, & Tan, 2022; World Bank, 2024).

Digital identity systems occupy a pivotal position within this transition. A verified digital identity can improve access to social benefits, banking and justice (Eke et al., 2022; Masiero & Bailur, 2021), whereas the absence of formal identification is a common condition among widows, internally displaced women and survivors fleeing abuse can exclude women from welfare support, banking and legal redress altogether (Lui, Ejiogu, & Adeyemi, 2025, as cited in the broader digital-identity literature). Where digital identity

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programmes are designed with gender-sensitivity and rights-based safeguards, they can enhance privacy and reduce misuse (Rodríguez & Nikolaidis, 2023); where poorly designed, they risk compounding discrimination, exposing personal data and endangering survivors under active surveillance by abusive partners (Hui et al., 2024; Cho et al., 2025).

Notwithstanding this potential, the empirical literature has tended to examine digital inclusion, GBV prevention and social protection as parallel rather than integrated fields of enquiry (Baekgaard, 2024; Ofori & Anyigba, 2024). Systematic evidence on how mobile technologies and digital identity systems jointly shape GBV-related outcomes within social protection programming particularly among women in the informal economy of West Africa remains limited. The present study addresses this gap by examining the extent to which access to mobile technology and digital identity is associated with women's ability to report and respond to GBV, and with the broader empowerment outcomes (safety, wellbeing, trust, reduced exclusion) that digitally enabled social protection is intended to deliver.

➢ *Objectives of the Study*

The broad aim of the study was to examine how mobile technologies and digital identity systems shape women's transition from vulnerability to empowerment in the context of GBV and social protection. The specific objectives were to:

- Examine the extent to which access to mobile technology and digital identity is associated with respondents' ability to report and respond to gender-based violence;
- Determine the association between digitally enabled social protection and women's empowerment outcomes (safety, physical, mental and social wellbeing, and trust);
- Identify the barriers that limit the effectiveness of mobile technologies and digital identity in GBV interventions; and
- Examine the relationship between digital exclusion and women's empowerment outcomes.

Correspondingly, the study tested the following directional hypotheses, derived from the theoretical framework in Section 2.7:

- H1: Mobile technology use is positively associated with access to social protection services.
- H2: Mobile technology use is positively associated with perceived safety.
- H3: Mobile technology use is positively associated with physical, mental and social wellbeing.
- H4: Mobile technology use is negatively associated with digital exclusion.
- H5: Digital exclusion is negatively associated with access, safety, wellbeing and trust.

II. LITERATURE REVIEW

➢ *Gender-Based Violence, Wellness and Structural Vulnerability*

GBV is a long-standing rather than emergent phenomenon, widely recognised as a global public-health issue and universal human-rights violation with drivers that operate at individual, community and societal levels (Agu et al., 2025; Abubakar et al., 2024; UN Women, 2023). It is multifaceted, encompassing overlapping physical, sexual, psychological, emotional and economic violence (UNHCR, n.d.), as well as less visible forms of epistemic, systemic and discursive violence (Reynolds, Griffith, & Ross, 2016; Mardon & Richardson-Self, 2022). Its roots lie substantially in patriarchal social structures and discriminatory gendered power imbalances (Kumari, Kihara, Sohail, Majid, Gemzell-Danielsson, & Benagiano, 2025), which render resolution difficult: GBV is embedded in social norms, power asymmetry and structural disparity rather than reducible to isolated perpetrator behaviour (Kumari et al., 2024, 2025).

Crises whether global, such as the COVID-19 pandemic, or local, market closures or flooding function as multipliers of risk: pre-existing income insecurity and household tension are exacerbated, and informal and formal support systems may collapse simultaneously. Women experiencing poverty, displacement or restrictive legal status are consequently vulnerable not only to violence itself but to exclusion from the very services designed to protect them, underscoring the need for interventions that address structural determinants alongside individual perpetrators. A substantial institutional architecture already exists in Nigeria to this end, including the Federal Ministry of Women Affairs, the National Agency for the Prohibition of Trafficking in Persons (NAPTIP), the Lagos State Domestic and Sexual Violence Agency, State Emergency Management Agencies, the International Federation of Women Lawyers (FIDA) Nigeria, and international partners such as UNFPA Nigeria, UNICEF Nigeria, the Spotlight Initiative and ActionAid Nigeria; the effectiveness of this architecture nonetheless depends on complementary, technology-enabled channels of access.

➢ *Social Protection and GBV*

Social protection comprises the policies, rules and programmes that reduce poverty and vulnerability by enabling efficient labour markets and managing exposure to risks such as unemployment, illness, disability and old age (Thimmappa, Saran, D'Souza, & B, 2021; Okon, 2018).

The United Nations Research Institute for Social Development (2010) frames social protection as addressing, preventing and overcoming conditions that undermine well-being, while García and Gruat (2003) emphasise its role in guaranteeing basic social and economic security. A growing body of evidence indicates that social protection instruments cash transfers, insurance and structured support programmes can prevent and respond to GBV by reducing women's financial dependency and expanding their choices (Al-Ahmadi et al., 2024; Lyles et al., 2025; Cookson et al., 2025), with the combination of cash transfers and community dialogue or case management showing particular promise

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(Little et al., 2021). At the same time, orthodox delivery mechanisms are not inherently protective: bureaucratic hurdles, limited privacy at pay points, and public queuing can expose beneficiaries to gossip, stigma or retaliation from abusers. The literature accordingly emphasises survivor-centered design principles, privacy, confidentiality and clear referral pathways as prerequisites for social protection programming to function as a genuine GBV mitigant rather than an inadvertent source of risk.

- *Digital Identity and Digital Social Protection*

Digital identity refers to the set of electronic attributes, personal details, authentication credentials such as biometrics or passwords, and behavioural or usage data that uniquely identify an individual, organisation or device within digital systems (Garey, 2024; Laurent, Denouël, Levallois-Barth, & Waelbroeck, 2015; Ante, Fischer, & Strehle, 2022; Varshney, Chelse, Tomar, & Paul, 2025). When integrated into social protection delivery, digital identity can streamline welfare administration, reduce fraud and improve the targeting of benefits (Ofori & Anyigba, 2024), while simultaneously carrying risks of marginalisation, data insecurity and administrative error for those unable to meet verification requirements.

Vujović, Jonathan, and Hacks (2024) find that digital access to social protection is shaped by educational level, income, gender, household size and formal-versus-informal sector status, and that financial access is further conditioned by education and gender; they identify identity verification and application simplification as priority areas for reform, while cautioning that unresolved digital-divide, infrastructural and digital-literacy gaps can deepen both financial and digital exclusion.

In the Nigerian context specifically, Eke et al. (2022) document ethical, legal and socio-cultural concerns surrounding the national digital identification programme, including gaps in data protection and inclusive design that disproportionately affect already-marginalised populations. Women who lack formal identification because of poverty, displacement or discriminatory legislation are frequently unable to access welfare, banking or legal redress, reinforcing the case for rights-based, gender-responsive digital identity design (Masiero & Bailur, 2021; Rodríguez & Nikolaidis, 2023).

- *Mobile Technologies, Digital Financial Inclusion and Women's Empowerment*

Mobile technologies are widely identified as critical catalysts of women's economic empowerment and digital financial inclusion (Shaikh, Glavee-Geo, Karjaluoto, & Hinson, 2023). By providing access to secure savings, credit and digital payments, mobile financial services allow women to circumvent conventional banking barriers, increase income and strengthen household decision-making power (Asongu & le Roux, 2023; Osabutey & Jackson, 2024). Mobile money reduces the time and safety costs associated with travel and queuing, while discreet digital payments can offer both autonomy and physical safety, easing access to funds for urgent needs, debt repayment and micro-enterprise formation (Aron, 2018; Kumar & Madhav, 2023; Suri et al., 2023).

Financial exclusion nonetheless remains a substantial constraint. Global Findex data show that women are disproportionately excluded from formal banking owing to a lack of identity documentation, lower rates of mobile-phone ownership and lower financial literacy (Demirguc-Kunt, Singer, Klapper, & Ansar, 2022). These barriers interact with restrictive social norms, the cost structure of formal financial services, and infrastructural limitations to sustain persistent gender disparities in financial inclusion across the African continent (Osabutey & Jackson, 2024; Okiro & Nsanzabaganwa, 2023; Ojarikre, Chidera, & Aiyedogbon, 2024).

- *Technology-Facilitated GBV, Privacy and Digital Exclusion*

Technology-facilitated gender-based violence (TFGBV), privacy violation and digital exclusion are analytically distinct but functionally interlocking phenomena that use digital tools as instruments of harm, control or exclusion from public life, disproportionately affecting women, girls and sexual minorities (Global Partnership for Action on Gender-Based Online Harassment and Abuse, 2023; Kluge, 2025).

TFGBV encompassing stalking, image-based sexual abuse, doxxing, harassment and AI-amplified misinformation is best understood as a continuation of offline abuse through digital means rather than a wholly distinct phenomenon (Kluge, 2025; Baekgaard, 2024), with consequences ranging from psychological distress and self-censorship to physical and economic harm.

Privacy violation involves the unauthorized access, collection or dissemination of personal data for purposes of harassment, intimidation or exploitation, including non-consensual image sharing, stalker ware and data-based coercion (sextortion) (Bogdani, 2023; Baekgaard, 2024). Digital exclusion, the third dimension, describes the systematic process by which women and minorities are pushed offline whether through fear of harassment, restricted access to devices, or partner surveillance of digital activity is producing a form of digital gender inequality distinct from, but reinforcing, offline exclusion (Kluge, 2025; Baekgaard, 2024). Global survey evidence suggests that approximately two-thirds of women worldwide report experiencing some form of TFGBV, spanning harassment, stalking and image-based abuse (Economist Intelligence Unit, 2021), with documented cases in which digital tools have been used to coerce or endanger women in conflict and post-conflict settings (Qiblawi et al., 2022) and to incite fatal violence following the circulation of manipulated images (CBS News, 2023).

Because poorly designed technologies can intensify TFGBV, privacy violation and digital exclusion simultaneously, an integrated analytical lens on GBV, digital identity and social protection is required as one capable of recognizing that digital tools can either amplify vulnerability

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or expand avenues for safety, empowerment and service delivery, depending on how they are designed and governed.

➢ *Toward an Integrated Framework: GBV, Digital Identity and Social Protection*

A recurring limitation identified in the literature is the persistence of siloed policy and technology design: GBV response, digital identity infrastructure and social protection delivery are frequently planned and administered by separate institutions using separate logics, even though women's lived experience of vulnerability and service-seeking is unified rather than compartmentalized (Ebong et al., 2025; Ekeh et al., 2025). Emerging pilot initiatives for example, programmes linking mobile payments to networks of local helplines and safe spaces illustrate the potential of coordinated, survivor-centred design, but such models remain uncommon and evidence on their sustained impact is still emerging. This gap motivates the present study's focus on the intersection of gender justice, digital transformation and social policy.

➢ *Theoretical Framework*

This study draws on four complementary theoretical perspectives. Social protection theory holds that public measures such as social assistance, social insurance and labour-market programmes are essential to protect individuals against economic and social distress and life-cycle risk, with the aim of guaranteeing a minimum standard of living, interrupting inter-generational poverty, and advancing rights-based empowerment (Vardanyan, 2020; Devereux & Sabates-Wheeler, 2004; Barrientos & Hulme, 2009). The capability approach conceptualises well-being as the expansion of substantive freedoms what people are effectively able to be and do and frames violence and exclusion from social protection as constraints on women's capabilities for bodily integrity, economic security and social participation. Empowerment theory explains how marginalised individuals and groups gain control over their lives, access resources, develop critical consciousness and exercise strategic life choices, with an emphasis on strength, self-efficacy and collective action to address systemic barriers (Zimmerman, 2000). Technology adoption and affordance theory, finally, highlights the perceived usefulness, ease of use and social embeddedness of digital tools, and how technologies afford certain actions while constraining others; women's uptake of mobile phones, digital identity and digital social protection systems is mediated by perceived risks including TFGBV, privacy loss and institutional mistrust as well as by structural constraints and support networks.

Read together, these frameworks position "Gloom to Bloom" as a conditional process: digital identity and mobile-enabled social protection can reduce or exacerbate structural vulnerability depending on design choices and the degree of agency women are able to exercise over the technologies concerned. This integrated framework underpins the hypotheses tested in Section 4.

III. METHODOLOGY

➢ *Research Design*

The study adopted a convergent parallel mixed-methods design (Bryman, 2016), in which quantitative survey data and qualitative interview/focus-group data were collected concurrently, analysed independently, and merged during interpretation. This design was selected to combine the construct-level evidence produced by the survey instrument with the contextual depth and lived-experience detail obtainable only through qualitative engagement and approach consistent with recommended practice for rigorous, policy-relevant social-science research on sensitive topics such as GBV (Bryman, 2016).

➢ *Study Setting and Population*

Data were collected between January and December 2025 in two per-urban trading settings: the Gwagwalada Market in Abuja, Federal Capital Territory, and the Orie-Ugba Market in Umuahia, Abia State. Gwagwalada Market follows the traditional four-day Igbo market cycle (Eke, Orie, Afor and Nkwo), with Nkwo designated as its principal trading day, while Orie-Ugba operates as a daily market. The target population comprised women engaged in formal and informal trade at these markets, a population selected because informal-sector women are simultaneously heavy users of mobile-money and point-of-sale technologies and among the groups most exposed to identity-verification and social-protection access barriers documented in the literature (Eluwa et al., 2024; Ojarikre et al., 2024).

➢ *Sampling and Sample Size*

Because a comprehensive sampling frame of market traders was not available, a purposive and convenience sampling strategy was used, administered through established women's trading groups and associations at both markets; this approach is consistent with practice in prior GBV and financial-inclusion research conducted in informal-economy settings where formal enumeration is impractical (Okonofua et al., 2024; Vujović et al., 2024). A total of 318 women who provided valid, complete responses constituted the final analytic sample. As the sample was drawn non-probabilistically, the findings should be interpreted as descriptive of, and analytically generalisable to, women in comparable informal-trading contexts rather than as statistically representative of the wider Nigerian female population; we return to this limitation in Section 7.

➢ *Instrumentation*

The quantitative instrument was a structured questionnaire capturing socio-demographic characteristics (age, educational status), GBV exposure, possession and use of digital identity documentation (the National Identification Number), internet and mobile-banking access, awareness of and access to social protection programmes, and eight multi-item Likert-type constructs access, safety, physical wellbeing, mental wellbeing, social wellbeing, privacy, exclusion and trust adapted from the digital-inclusion, empowerment and social-protection literatures reviewed in Section 2. The qualitative strand used semi-structured interview and focus-group discussion guides exploring

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participants' experiences of GBV, digital identity, mobile-technology use and engagement with social protection programmes.

➢ *Data Collection Procedures*

Quantitative questionnaires were self- or interviewer-administered to women's trading groups, given the impracticality of individual survey administration within the active market environment. Semi-structured interviews and focus-group discussions were conducted in parallel with willing participants at both sites. A preliminary pilot survey in peri-urban Abuja informed refinements to the instrument prior to full deployment; the pilot indicated that, while over half of respondents had received social payments via mobile phone in the preceding year, several women particularly widows and internally displaced women experienced specific difficulties with digital identity verification, a finding that shaped the emphasis of the final data collection instruments.

➢ *Ethical Considerations*

Participation was entirely voluntary; respondents could decline any question or withdraw at any stage without consequence. No names, phone numbers or other directly identifying information were recorded, and all qualitative excerpts reported in this manuscript are anonymised and, where necessary, described only by role or setting. The study was conducted in accordance with the ethical principles for research involving human participants set out in the Declaration of Helsinki; institutional ethical approval was obtained from [author to insert the name of the approving institutional review board/ethics committee and the approval reference number prior to submission].

IV. DATA ANALYSIS, RESULTS AND DISCUSSION

Quantitative data were entered, cleaned and analysed in SPSS version 27, with double data entry and second-reviewer resolution of discrepancies. Descriptive statistics summarised the sample and key variables. Reliability and convergent validity of the eight multi-item constructs were assessed using Cronbach's alpha, composite reliability and average variance extracted, and discriminant validity was assessed using the heterotrait–monotrait ratio of correlations. Given the ordinal, Likert-scaled nature of the construct data, bivariate associations among constructs were examined using Spearman's rank-order correlation. Qualitative data from interviews and focus groups were analysed thematically following the approach of Braun and Clarke (2006), with themes developed inductively and then read against the theoretical framework in Section 2.7. The quantitative and qualitative strands were analysed independently and integrated at the interpretation stage, consistent with the convergent parallel design (Bryman, 2016).

We note, as a matter of methodological transparency, that the present analysis reports bivariate correlational rather than multivariate path or regression relationships among constructs; the reliability and validity indices reported in Table 1 (composite reliability, average variance extracted and the heterotrait–monotrait ratio) reflect the measurement model. Formal structural path modelling to test directional and mediated relationships among access, safety, wellbeing, exclusion and trust — which would allow objectives 2 and 4 to be addressed with full statistical rigour — is identified in Section 7 as a priority for the associated full structural model paper and for future replication.

➢ *Results:*

The mean age of respondents was 36.2 years (range 24–84). All participants had attained at least secondary education, and all possessed a National Identification Number.

- *Measurement Model: Reliability and Validity*

Table 1 Construct Means, Standard Deviations, Reliability and Convergent Validity (N = 318)

Construct	Mean	SD	Cronbach's α	Composite Reliability	AVE
Access	3.61	1.00	0.82	0.87	0.60
Safety	3.49	0.96	0.84	0.88	0.62
Physical wellbeing	3.22	0.89	0.81	0.85	0.58
Mental wellbeing	3.57	1.04	0.83	0.87	0.61
Social wellbeing	3.53	1.10	0.84	0.88	0.63
Privacy	3.72	0.63	0.82	0.86	0.59
Exclusion	3.62	1.13	0.81	0.85	0.57
Trust	3.30	0.99	0.83	0.87	0.60

Source: Authors' Fieldwork, 2025.

The measurement model showed satisfactory reliability and validity. Composite reliability ranged from 0.85 to 0.88, indicating strong internal consistency, and average variance extracted ranged from 0.57 to 0.63, indicating that each construct explained a substantial proportion of variance in its indicators. Discriminant validity, assessed via the heterotrait–monotrait ratio, supported the conceptual distinctness of the constructs. The measurement model was therefore judged reliable and valid for subsequent analysis.

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- *Awareness of Social Protection and Digital Access*

Table 2 Awareness of Social Protection Programmes and Access to the Internet (N = 318)

Variable	Category	n (%)
Awareness of social protection programme	Very high	35 (11.0)
	High	56 (17.6)
	Moderate	88 (27.7)
	Low	96 (30.2)
	Very low	43 (13.5)
Access to internet	Yes	310 (97.5)
	No	8 (2.5)
Access to internet banking	Yes	307 (96.5)
	No	11 (3.5)

Source: Authors' Fieldwork, 2025.

Approximately 44% of respondents reported low or very low awareness of social protection programmes, notwithstanding near-universal access to the internet (97.5%) and internet banking (96.5%). This gap between digital connectivity and programme awareness is a central finding of the study, indicating that connectivity alone is an insufficient condition for effective social protection uptake.

- *Preferred Solutions to GBV*

Table 3 Respondents' Preferred Solutions to GBV (N = 318)

Solution	n (%)
Government should enact laws against GBV	318 (100.0)
Women should be empowered financially	273 (85.8)
Creation of more awareness about GBV	301 (94.7)
Establishment of dedicated GBV intervention mechanisms	304 (95.6)
Creation of a dedicated, anonymous GBV reporting line	299 (94.0)
More education on the dangers and prevention of GBV	306 (96.2)
Unbiased and prompt justice for GBV victims	301 (94.7)
Rehabilitation centres for GBV survivors	184 (57.9)

Source: Authors' Fieldwork, 2025.

All respondents supported legislative action against GBV. Strong majorities supported financial empowerment (85.8%), awareness campaigns (94.7%), dedicated intervention mechanisms (95.6%), anonymous reporting lines (94.0%), expanded education (96.2%) and prompt, unbiased justice (94.7%). Support for rehabilitation centres was comparatively lower (57.9%), suggesting a residual policy gap in post-intervention survivor support relative to prevention and reporting infrastructure.

- *Bivariate Relationships Among Constructs*

Table 4 Spearman's Rank-Order Correlations Among Study Variables (N = 318)

Variable	1	2	3	4	5	6	7	8	9
1. Mobile use	1.00								
2. Access	.30**	1.00							
3. Safety	.28**	.84**	1.00						
4. Physical WB	.28**	.77**	.78**	1.00					
5. Mental WB	.28**	.83**	.89**	.79**	1.00				
6. Social WB	.28**	.82**	.90**	.78**	.90**	1.00			
7. Privacy	.29**	.30**	.21**	.30**	.23**	.21**	1.00		
8. Exclusion	-.23**	-.51**	-.46**	-.45**	-.45**	-.47**	-.23**	1.00	
9. Trust	.29**	.78**	.87**	.73**	.81**	.81**	.20**	-.45**	1.00

** Spearman's Rank Correlation Significant at p < .01 (Two-Tailed). WB = Wellbeing.

Source: Authors' Fieldwork, 2025.

Mobile technology use correlated positively with access (rs = .30), safety (rs = .28), physical wellbeing (rs = .28), mental wellbeing (rs = .28), social wellbeing (rs = .28), privacy (rs = .29) and trust (rs = .29), and negatively with exclusion (rs = -.23) — all significant at p < .01 indicating that higher mobile engagement is associated with lower reported exclusion (supporting H1, H2, H3 and H4). Access, safety, mental wellbeing, social wellbeing and trust were strongly intercorrelated (rs = .78 to .90), reflecting a coherent underlying empowerment dimension, whereas privacy

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showed comparatively weaker associations with the other constructs (rs = .21 to .30), underscoring its conceptually distinct role. Exclusion was significantly and negatively associated with access (rs = -.51), safety (rs = -.46) and the wellbeing indicators (rs = -.45 to -.47), supporting H5 and indicating that exclusion consistently undermines the outcomes that digitally enabled social protection is intended to produce.

➢ *Qualitative Findings:*

Thematic analysis of the interview and focus-group data identified five interrelated themes that contextualize the quantitative associations reported above.

- *Theme 1: The mobile phone as a dual-edged lifeline.*

Participants repeatedly described the mobile phone as both a source of protection and a point of vulnerability. Several women reported using discreet mobile-money transfers and messaging applications to build financial independence and to seek help covertly.

"When I get money on my phone, my husband can't steal it from me." (focus-group participant, Orie-Ugba Market, 2025)

Yet the same device could become an instrument of control where partners restricted or monopolised its use.

"I can't do much if my husband has the phone." (focus-group participant, 2025)

Consistent with this, one respondent described losing an entire mobile-money balance when a partner gained access to her phone; she attributed her recovery to a community-based women's support platform she joined subsequently.

- *Theme 2: Digital Identity as a Gatekeeper to Protection*

Women without accessible identity documentation, particularly widows and displaced women, described feeling institutionally invisible.

"If you don't have the paper, you can't count." (interview participant, 2025)

Some respondents reported having to borrow another woman's identification to access a benefit, illustrating both the ingenuity of survivors and the systemic risk created by rigid, undocumented identity-verification requirements.

- *Theme 3: Structural and Infrastructural Barriers to Digital Inclusion*

Despite near-universal internet access, participants identified the high cost of data, unreliable network infrastructure, inconsistent electricity supply, and platform overload with unsolicited or fraudulent content as persistent barriers. Roughly 93% of qualitative respondents raised concerns about account hacking, particularly through fraudulent links circulated on messaging platforms, underscoring that connectivity without cyber-security literacy can itself become a source of financial risk.

- *Theme 4: Survivor-Led Technological Innovation*

Several participants described adapting consumer technologies for personal safety in the absence of formal support: installing smart door locks and security cameras to monitor children's rooms, using voice-activated devices programmed to alert family members in emergencies, and installing mobile applications that silently notified relatives when they were in danger. One participant described this self-directed safety infrastructure as a form of protection that formal institutions had not provided.

- *Theme 5: Financial Empowerment as a Precondition for Exit and Voice*

A recurring narrative linked financial independence directly to the capacity to leave an abusive situation or access support.

"If a woman has her own money, she can find options. If not, she is forced to stay." (social worker, 2025)

Respondents who had received cash transfers or built small enterprises described using this income not only for material needs but to found peer-support structures including informal soft-loan schemes for young mothers and free medical outreach organised through women's associations extending the empowerment effect of digital and financial access beyond the individual recipient.

➢ *Discussion:*

This study sets out to examine how mobile technology and digital identity shape women's transition from vulnerability to empowerment in the context of GBV and social protection. Consistent with objective 1, higher mobile technology engagement was positively associated with access to services and with reporting-relevant outcomes such as safety and trust, corroborating prior evidence that digital tools can reduce practical and psychological barriers to help-seeking, particularly for marginalised populations (UN Women, 2021; Tasnima & Md Syed, 2024; Dang, Sadreddin, & Ahuja, 2024).

In relation to objective 2, the strong inter-correlation among access, safety, well-being and trust (rs = .78–.90) suggests that these outcomes function as a coherent empowerment cluster rather than as independent effects a pattern consistent with the capability approach's treatment of well-being as an interdependent expansion of substantive freedoms (Sen's capability tradition, as operationalized in Section 2.7). The comparatively weaker association of privacy with the remaining constructs (rs = .21–.30) is an important and, in our reading, under-appreciated finding: it indicates that privacy risk operates as a partially independent constraint on technology adoption, capable of limiting the protective potential of otherwise accessible and trusted digital tools. This is consistent with the technology-facilitated GBV literature's emphasis on "safety-by-design", anonymity, secure authentication and controlled notification behaviour as a precondition, rather than an optional enhancement, for digital social protection tools intended for GBV-affected populations (Kluge, 2025; Baekgaard, 2024).

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With respect to objectives 3 and 4, exclusion emerged as the most consistently disruptive construct in the model, correlating negatively with every other outcome, including trust. The qualitative data clarify the mechanisms underlying this pattern: exclusion in this sample was driven less by an absence of internet access which was nearly universal than by the cost of data, infrastructural unreliability, low digital-security literacy, and partner control over shared devices. This distinction matters for policy: interventions premised solely on expanding connectivity are unlikely to resolve exclusion that is rooted in affordability, infrastructure and intra-household power dynamics rather than access per se.

The finding that 44% of respondents reported low awareness of social protection programmes despite near-universal internet access reinforces this interpretation.

Digital connectivity is a necessary but not sufficient condition for effective social protection uptake; deliberate outreach, simplified enrolment and trusted intermediaries (as seen in participants' reliance on women's associations and peer networks) appear essential to converting connectivity into actual programme access. This is consistent with Vujović et al.'s (2024) finding that digital and financial access are jointly shaped by education, income, gender and formal/informal sector status, rather than by connectivity alone.

The qualitative themes further illustrate the theoretical framework in action. Instances of survivor-led technological innovation, smart locks, alert applications, covert savings exemplify empowerment theory's emphasis on agency and self-efficacy in the face of systemic barriers (Zimmerman, 2000), while accounts of device confiscation and mobile-money theft by abusive partners illustrate the affordance-constraining side of technology adoption theory: the same tool that enables discreet help-seeking can, under partner control, become an instrument of surveillance and restriction. Taken together, the evidence supports a central conclusion of this study: mobile technology and digital identity are not unconditionally empowering; their protective value is conditional on privacy-protective, survivor-centred design and on complementary investment in affordability, infrastructure and awareness.

V. CONCLUSION AND POLICY RECOMMENDATIONS

- *Conclusion:*

This study demonstrates that mobile technology and digital identity can meaningfully advance the transition of GBV-affected women from vulnerability ("gloom") to empowerment ("bloom"), but that this potential is conditional rather than automatic. Digital access was consistently associated with better safety, wellbeing and trust outcomes and with reduced exclusion, yet near-universal connectivity coexisted with substantial gaps in programme awareness, privacy protection and freedom from partner-mediated device control. Realising the protective potential of digital identity and mobile-enabled social protection therefore requires deliberate, survivor-centered design encompassing privacy safeguards, affordability, infrastructural reliability and trusted intermediary outreach rather than connectivity expansion alone. Digital tools should be understood as a complement to, and not a substitute for, human care, legal protection and institutional support for survivors of gender-based violence.

- *Policy Recommendations;*

Invest in digital literacy and awareness campaigns. Given that internet access was near-universal but programme awareness was low, awareness campaigns and digital-literacy training delivered through trusted intermediaries such as women's trading associations are likely to yield larger gains in social protection uptake than further connectivity expansion alone.

Institutionalize anonymous, secure digital reporting channels. Government agencies and non-governmental organizations should establish confidential, mobile-accessible GBV reporting mechanisms designed to specifications that address the privacy concerns identified in Theme 3 and Section 5, including safeguards against detection by an abusive partner sharing the same device.

Address structural and infrastructural barriers directly. Programme design should account for the cost of data, network reliability and shared-device dynamics that this study identifies as the practical drivers of digital exclusion, rather than treating exclusion as solely an access or literacy problem.

Design for well-being, not only for transaction completion. Because access, safety and well-being outcomes are strongly interrelated, digital social protection tools should be evaluated against well-being and trust outcomes, not merely against enrolment or disbursement metrics.

Strengthen the legislative and rehabilitative ecosystem around digital tools. Universal respondent support for anti-GBV legislation, combined with comparatively lower support for rehabilitation centres, suggests that policy attention has concentrated on prevention and reporting infrastructure at the relative expense of post-intervention survivor support; digital referral tools should be explicitly linked to rehabilitation and long-term reintegration services.

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APPENDIX

➢ *Limitations*

Several limitations qualify these findings. First, the cross-sectional design precludes causal inference; the associations reported here, while theoretically consistent, cannot establish the direction or mechanism of effect. Second, the non-probability, purposive sampling strategy necessitated by the absence of a formal market-trader sampling frame limits statistical generalizability beyond women in comparable informal-trading settings. Third, the study is geographically confined to two markets in two states and may not capture rural, conflict-affected, or northern Nigerian contexts in which digital-infrastructure and security conditions differ substantially. Fourth, all measures relied on self-report, which is susceptible to social-desirability and recall bias, particularly for a sensitive topic such as GBV. Fifth, and most consequentially for future submissions building on this dataset, the present analysis reports the measurement model (reliability and validity) and bivariate correlations but does not report a formal structural or regression-based path model; we recommend that a companion or extended analysis apply structural equation modelling or regression-based path analysis to formally test the directional and mediated relationships hypothesised in Section 2.7, which would substantially strengthen causal interpretation of objectives 2 and 4. Finally, the qualitative excerpts, while illustrative and analytically integrated, are not attached to a documented saturation analysis or an explicit count of interview and focus-group participants; future reporting should specify the qualitative sample size, saturation criteria and coding reliability (e.g., inter-rater agreement) in full.

➢ *Declarations*

- *Ethics Approval and Consent to Participate*

This study involved human participants and was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval was obtained from [author to insert institutional review board/ethics committee name and approval number]. Informed consent was obtained from all participants prior to data collection.

- *Consent for Publication*

Not applicable. No identifying images or individual-level data are included in this manuscript.

- *Availability of Data and Materials*

The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request, subject to participant confidentiality protections.

- *Competing Interests*

The authors declare that they have no competing interests.

- *Funding*

No external funding

➢ *Authors' Contributions*

I.O.U. conceived the study, led data analysis and drafted the manuscript. M.U. contributed clinical and field observations and reviewed the manuscript for public-health accuracy. D.J.W.& C.K.O contributed to instrument design, qualitative data collection and manuscript review. All authors read and approved the final manuscript.

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