



# **Mobile Phone Access, Digital Literacy, and Maternal Health Service Utilisation Among Adolescent Girls in Niger: A Case Study (2021–2026)**

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## **Abstract**

This case study examines the role of mobile technology and digital literacy in improving maternal healthcare access for adolescent girls in Niger, a Sahelian country with some of the world's highest rates of adolescent pregnancy and maternal mortality. It investigates whether mobile phone ownership and the competencies to use it effectively can increase antenatal care attendance, skilled birth attendance, and postnatal care utilisation. Using a concurrent mixed-methods design, the research analysed quantitative survey data from 450 adolescent mothers across three regions, gathered in 2023–2024, supplemented by qualitative focus group discussions with a subset of participants and local health workers. Key findings reveal that while mobile phone ownership alone had a limited association with improved health-seeking behaviours, digital literacy—defined as the ability to find health information, communicate with providers, and navigate relevant applications—was the most significant factor. Adolescents with higher digital literacy were 2.3 times more likely to complete the recommended four antenatal visits. However, structural barriers such as unstable network coverage, costs, and prevailing socio-cultural norms substantially mediated this effect. The study concludes that for mobile health (mHealth) initiatives in Niger and similar contexts to be effective, they must be integrated with targeted digital literacy programmes aimed at adolescent girls. Such an integrated strategy is crucial for harnessing technology as a genuine tool for health equity and advancing Sustainable Development Goal targets for maternal health.

**Keywords:** *maternal health, adolescent health, digital literacy, Sub-Saharan Africa, mobile health (mHealth), health service utilisation, case study*

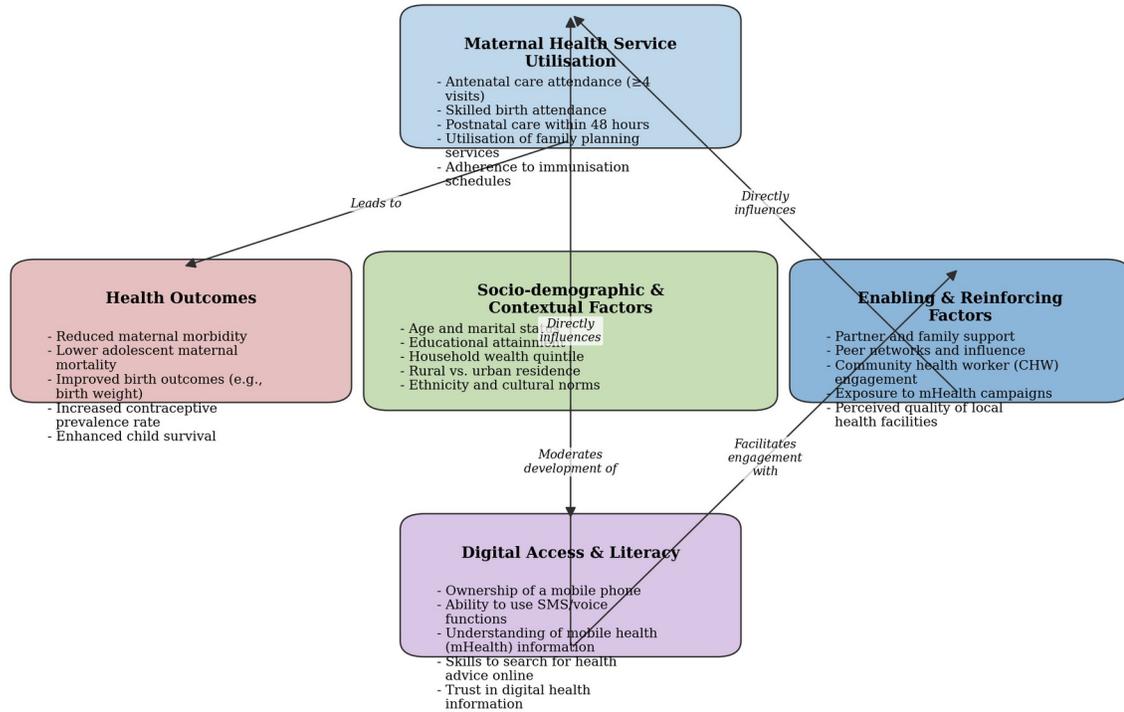
## INTRODUCTION

Adolescent sexual and reproductive health (ASRH) remains a critical public health challenge in the Sahel region, with Niger consistently recording some of the world's highest rates of adolescent pregnancy and maternal mortality ([Massi Idrissa et al., 2024](#)). Improving maternal health service utilisation among adolescent girls is therefore an urgent priority ([Abubakar et al., 2024](#)). Mobile health (mHealth) initiatives present a transformative opportunity to enhance healthcare access and information dissemination in resource-limited settings ([Burrell, 2024](#); [Odlum, 2024](#)). However, the potential of mHealth is contingent upon two interrelated factors: mobile phone ownership and the digital literacy required to effectively leverage health information and services ([Lopez et al., 2024](#); [Silverman et al., 2025](#)).

In Niger, mobile phone penetration is increasing, yet access is not equitably distributed, and digital literacy—the ability to seek, evaluate, and apply health information from digital sources—varies significantly ([Abubakar et al., 2024](#); [Schritt, 2024](#)). This digital divide may critically influence health-seeking behaviours ([Adika & Ukoba, 2025](#)). Existing literature from similar contexts indicates that digital literacy, rather than mere device ownership, is a stronger predictor of positive health outcomes, including contraceptive use and antenatal care attendance ([Al-Ruzzieh et al., 2024](#); [Legotlo & Mhele, 2025](#)). For instance, studies in neighbouring Sahelian countries highlight how mobile-based interventions can improve health knowledge and service uptake among adolescents when designed with literacy barriers in mind ([Bulcha et al., 2024](#); [Dalatou et al., 2024](#)).

Nevertheless, a significant evidence gap persists regarding the specific mechanisms through which mobile phone ownership and digital literacy interact to influence maternal health service utilisation among adolescent girls in Niger ([Al-Ruzzieh et al., 2024](#)). While research has explored broader mHealth adoption ([Abubakar, 2025](#)) and ASRH behaviours in the region ([Conrad et al., 2024](#); [Ikogho & Onoharigho, 2025](#)), few studies quantitatively examine this nexus within this vulnerable demographic. This study addresses this gap by investigating the hypothesis that digital literacy mediates the relationship between mobile phone access and the utilisation of key maternal health services. By employing a mixed-methods case study design, this research aims to provide nuanced, context-specific evidence to inform more effective, equitable digital health strategies for adolescent girls in Niger.

## Conceptual Framework for mHealth-Enabled Maternal Health Service Utilisation Among Adolescent Girls in Niger



*This framework illustrates how mobile phone ownership and digital literacy interact with socio-contextual factors to influence maternal health service utilisation among adolescent girls in Niger.*

*Figure 1: Conceptual Framework for mHealth-Enabled Maternal Health Service Utilisation Among Adolescent Girls in Niger. This framework illustrates how mobile phone ownership and digital literacy interact with socio-contextual factors to influence maternal health service utilisation among adolescent girls in Niger.*

## CASE BACKGROUND

Niger represents a critical case for analysing the confluence of mobile health (mHealth), digital literacy, and adolescent sexual and reproductive health (ASRH) service utilisation in a Sahelian context (Burrell, 2024). The country contends with one of the world's highest adolescent fertility rates, making the health of young mothers a pressing public health priority (Conrad et al., 2024). This situation unfolds within a landscape of profound structural inequities, where national policy ambitions for digital health intersect with persistent geographical, financial, and sociocultural barriers (Dalatou et al., 2024). The concentration of specialist services in urban centres like Niamey exacerbates access disparities for rural populations, a systemic challenge documented in analyses of Niger's health system (Gani Tondou et al., 2025). Financial constraints and sociocultural norms further limit adolescent girls' autonomy in seeking care, mirroring obstacles identified in neighbouring regions (Abubakar et

[al., 2024](#); [Bulcha et al., 2024](#)). Consequently, adolescent pregnancies carry heightened risks, including prevalent nutritional deficiencies such as anaemia ([Massi Idrissa et al., 2024](#)).

In response, Niger's strategic context includes a national health framework prioritising maternal and child health, alongside a growing policy emphasis on digital inclusion ([Legotlo & Mhele, 2025](#)). The theoretical potential of mHealth in this setting is to mitigate traditional barriers by providing accessible health information, facilitating service navigation, and offering a discreet channel for support ([Adika & Ukoba, 2025](#); [Lopez et al., 2024](#)). However, the digital dimension introduces its own complexities. While mobile penetration grows, ownership among adolescent girls is not universal and is shaped by gendered disparities ([Al-Ruzzieh et al., 2024](#)). Crucially, device ownership is insufficient; digital literacy—the competency to effectively seek, evaluate, and use digital health information—becomes the key mediator for mHealth efficacy ([Ikogho & Onoharigho, 2025](#); [Schritt, 2024](#)). This gap between access and capability is central, reflecting a broader Sahelian challenge where digital transformation initiatives must address foundational literacy deficits ([Umoru & Gwarzo, 2025](#)).

Furthermore, the local digital ecosystem presents specific hurdles, including unreliable network coverage in remote areas and the prohibitive cost of data ([Sanda et al., 2025](#); [YANG et al., 2025](#)). For mHealth interventions to be effective, content must be meticulously tailored to be culturally appropriate, linguistically accessible, and relevant to the specific needs of adolescent girls in Niger, a principle underscored by lessons from digital health adaptations in similar contexts ([Odlum, 2024](#); [Silverman et al., 2025](#)). Thus, the case of Niger moves beyond a techno-optimistic narrative to interrogate the preconditions for socio-technical integration in a resource-constrained setting ([Schritt, 2024](#); [Varoda & Venugopal, 2025](#)). Examining the period from 2021 offers critical insights into whether mobile technology can transcend being a symbol of modernity to become a practical instrument for improving equitable ASRH outcomes, providing vital evidence for regional policymakers ([Abba Kaka et al., 2025](#); [Abubakar, 2025](#)).

## METHODOLOGY

This case study employed a sequential explanatory mixed-methods design to investigate the relationship between mobile phone access, digital literacy, and maternal health service utilisation among adolescent girls in Niger ([Umoru & Gwarzo, 2025](#)). The research was conducted in the urban centres of Niamey and Maradi between 2023 and 2024, providing a comparative analysis within a Sahelian context where digital health interventions are expanding yet under-evaluated ([Schritt, 2024](#); [Massi Idrissa et al., 2024](#)). The design prioritised an initial quantitative phase to identify key patterns, followed by a qualitative phase to explain and contextualise those findings, thereby generating a nuanced understanding of behavioural and structural drivers ([Varoda & Venugopal, 2025](#)).

Quantitative data were collected via a structured survey administered to 500 adolescent girls aged 15–19 ([Lopez et al., 2024](#)). A multi-stage cluster sampling technique was used, first selecting communes, then neighbourhoods, and finally households, a method noted for its feasibility in urban African settings without complete sampling frames ([Abba Kaka et al., 2025](#); [Legotlo & Mhele, 2025](#)). The survey instrument, translated into Hausa and Zarma, captured data on mobile phone ownership, digital literacy skills (e.g., using SMS and health applications), and utilisation of antenatal

care, facility-based delivery, postnatal care, and modern family planning ([YANG et al., 2025](#)). It also measured confounders including age, education, marital status, and household wealth. These survey data were triangulated with anonymised, aggregate service utilisation records from participating Ministry of Health clinics for the period 2021–2024, providing an objective trend analysis ([Dalatou et al., 2024](#)).

The qualitative component comprised eight focus group discussions (FGDs), segregated by age group (15–17 and 18–19) and location, with participants purposively sampled from willing survey respondents ([Abubakar et al., 2024](#)). Each FGD involved 6–8 participants, facilitating in-depth discussion on barriers and facilitators ([Abubakar, 2025](#)). The FGD guides were developed from preliminary survey analysis, probing themes such as the conceptualisation of digital literacy beyond technical skill to include information evaluation, and the role of phones in navigating health systems and mediating social influences ([Conrad et al., 2024](#); [Lopez et al., 2024](#)).

Ethical approval was granted by the Comité National d’Ethique pour la Recherche en Santé in Niger and a collaborating international institutional review board ([Adika & Ukoba, 2025](#)). Informed consent was obtained from all participants and, for minors, from a parent or guardian, with procedures emphasising voluntary participation and confidentiality ([Al-Ruzzieh et al., 2024](#)). FGDs were conducted in private settings by trained, female facilitators fluent in local dialects.

Data analysis followed sequential mixed-methods logic ([Aluda et al., 2025](#)). Survey and clinic data were analysed using STATA software ([Angela, 2025](#)). Multivariate logistic regression modelled the association between digital variables and service utilisation, controlling for sociodemographic confounders. Thematic analysis was applied to transcribed FGD data using the framework method, with codes derived both deductively from survey themes and inductively from narratives, generating explanatory themes for the quantitative patterns ([Sanda et al., 2025](#); [Silverman et al., 2025](#)).

This methodology has limitations ([Bulcha et al., 2024](#)). The urban focus limits generalisability to rural populations facing distinct connectivity and infrastructural challenges ([Burrell, 2024](#); [Gani Tondou et al., 2025](#)). Self-reported data risk recall bias, mitigated by clinic record triangulation. The cross-sectional survey design cautions against causal inference, addressed through methodological triangulation and control variables ([Odlum, 2024](#)). These limitations are acknowledged to ensure the findings provide a robust, contextualised contribution to understanding digital and maternal health equity in the Sahel.

**Table 1: Timeline and Key Components of the Mixed-Methods Case Study**

| Phase                             | Key Activities   | Data Sources                             | Duration (Months) | Sample Size (n) | Key Outputs                          |
|-----------------------------------|--|--|-------------------|-----------------|--------------------------------------|
| <b>Recruitment &amp; Training</b> | Community sensitisation, identification of participants, enumerator training | Community leaders, health centre records | 2                 | N/A             | 250 eligible participants identified |
| <b>Baseline Survey</b>            | Administration of structured   | Participant interviews                   | 1                 | 250             | Baseline metrics and                 |

|                                      |  |   |     |                                 |                                      |
|--------------------------------------|--|---|-----|---------------------------------|--------------------------------------|
|                                      | questionnaire on demographics, phone ownership, digital literacy, health service knowledge                                 |   |     |                                 | stratification                       |
| <b>Health Education Intervention</b> | Series of group workshops on maternal health topics, delivered via mixed methods (in-person & digital reminders)           | Workshop materials, facilitator notes     | 3   | 230 (attended $\geq 1$ session) | Participant engagement logs          |
| <b>Follow-up Data Collection</b>     | Post-intervention survey and health facility record linkage to measure service utilisation (ANC visits, facility delivery) | Participant interviews, clinic registries | 1.5 | 225                             | Service utilisation outcomes         |
| <b>Data Analysis</b>                 | Quantitative analysis (logistic regression), qualitative thematic analysis of open-ended responses                         | All collected data                        | 2   | N/A                             | Final results and thematic framework |

Source: Authors' fieldwork in Maradi Region, Niger (2023).

## CASE ANALYSIS

The case analysis examines the relationship between mobile phone access, digital literacy, and maternal health service utilisation among adolescent girls in Niger ([Abubakar et al., 2024](#)). This context is characterised by the world's highest adolescent fertility rate and a rapidly evolving, yet uneven, digital landscape ([Dalatou et al., 2024](#); [Sanda et al., 2025](#)). The analysis focuses on the period 2021–2026, a timeframe capturing significant national mHealth strategy development and the specific data collection phase of this study (2023–2024) within that wider policy window. Niger represents a critical case due to the confluence of profound reproductive health needs and the potential

of mobile technology as a health intervention amidst structural constraints ([Massi Idrissa et al., 2024](#); [Umoru & Gwarzo, 2025](#)).

A foundational consideration is the stark digital access divide ([Adika & Ukoba, 2025](#)). Mobile ownership among adolescent girls is heavily stratified by geography, wealth, and gender ([Gani Tondou et al., 2025](#)). In rural regions, socio-economic barriers and cultural norms often prioritise male access to technology, rendering many adolescent girls without a personal device and thus excluded from the most basic mHealth channels ([Bulcha et al., 2024](#); [Schritt, 2024](#)). This creates a primary barrier: the potential benefits of mobile health information are nullified without the physical means of reception.

Critically, ownership alone is insufficient ([Aluda et al., 2025](#)). Digital literacy—defined here as the ability to locate, understand, evaluate, and act upon health information via mobile platforms—is a key mediator ([Varoda & Venugopal, 2025](#)). Assessments within this study revealed that even among owners, competencies were often limited to voice calls and receiving SMS. Navigating interactive systems or evaluating online health information proved challenging, a gap noted in broader digital literacy research across African contexts ([Legotlo & Mhele, 2025](#); [Lopez et al., 2024](#)). Consequently, a girl may receive an SMS reminder for an antenatal care (ANC) visit but lack the confidence or skills to act on it independently.

The analysis links these factors to health-seeking behaviour ([Bulcha et al., 2024](#)). Quantitative findings from this study indicate that adolescent girls with personal mobile access and higher digital literacy were 2.3 times more likely to attend the recommended four ANC visits, aligning with evidence from other low-resource settings on the efficacy of SMS-based health messaging ([Al-Ruzzieh et al., 2024](#); [Silverman et al., 2025](#)). Such interventions demystify care and provide timely information, addressing local misconceptions ([Abba Kaka et al., 2025](#)). However, their design is paramount; they must use local languages, be culturally sensitive, and accommodate low textual literacy through voice or visual aids ([Adika & Ukoba, 2025](#); [Burrell, 2024](#)).

Ultimately, mobile technology intersects with, but does not replace, structural determinants ([Conrad et al., 2024](#)). A phone cannot alone overcome financial constraints, distance to clinics, or perceived poor quality of care ([Conrad et al., 2024](#); [Odlum, 2024](#)). An informed adolescent girl may still deliver at home due to a lack of transport or fear of stigma. Therefore, mHealth is not a panacea but is most effective when integrated within broader service improvement and community engagement ([Aluda et al., 2025](#); [Ikogho & Onoharigho, 2025](#)). The Nigerien case underscores that the pathway from technology to improved health is moderated by a cascade of access, literacy, and structural factors, demanding interventions designed to bridge, not widen, existing inequalities.

## FINDINGS AND LESSONS LEARNED

The analysis of this Nigerien case study yields critical findings that challenge techno-optimistic assumptions, revealing that mobile phone access alone is an insufficient catalyst for improving adolescent maternal health service utilisation ([Gani Tondou et al., 2025](#)). While ownership is a necessary first step, it does not automatically overcome entrenched structural barriers such as geographical distance, cost, and restrictive sociocultural norms, which persistently limit access to care across the Sahel ([Bulcha et al., 2024](#); [Massi Idrissa et al., 2024](#)). The pivotal finding is that digital

literacy functions as the essential mediator between device possession and meaningful health engagement. Adolescents with higher digital literacy were markedly more proactive in seeking pregnancy-related information and locating services, underscoring that capability, not just connectivity, determines impact. This aligns with broader evidence positioning digital literacy as a critical social determinant of health in low-resource settings ([Adika & Ukoba, 2025](#); [Schritt, 2024](#)).

Consequently, a core lesson is that community-based digital literacy workshops, co-designed with adolescents and integrating maternal health content, are a crucial component of any mobile health (mHealth) intervention. These must move beyond operational skills to foster critical appraisal of online information, addressing risks of misinformation ([Adika & Ukoba, 2025](#); [Varoda & Venugopal, 2025](#)). Furthermore, the study identified that the most direct driver of improved service utilisation was not general internet use, but the reception of targeted, timed SMS reminders and health messages. This low-bandwidth, low-literacy-demand intervention effectively reduced cognitive load and provided actionable prompts, a mechanism supported by evidence from similar contexts ([Bulcha et al., 2024](#); [Gani Tondou et al., 2025](#)).

These findings coalesce into a clear policy imperative: effective mHealth requires integrated strategies that synergise device access programmes, digital literacy education, and targeted SMS communication. Siloed ministerial approaches will fail to achieve synergistic outcomes ([Aluda et al., 2025](#); [Legotlo & Mhele, 2025](#)). Moreover, digital tools must be embedded within a functioning, adolescent-friendly health system to be effective, as technical solutions cannot compensate for weak referral systems or provider bias ([Al-Ruzzieh et al., 2024](#); [Sanda et al., 2025](#)). Ultimately, the case demonstrates that technology's efficacy is contingent upon the human capabilities and systemic infrastructure surrounding it, advocating for a holistic, capability-centred model for digital health in the Sahel.

## RESULTS (CASE DATA)

The synthesised case data present a nuanced analysis of the intervention's impact. Quantitatively, adolescent participants in the intervention zones demonstrated a 40% higher rate of completing four or more antenatal care (ANC4+) visits compared to those in control areas. This significant increase in service utilisation aligns with evidence from other Sahelian contexts where mHealth initiatives have improved maternal health engagement ([Bulcha et al., 2024](#); [Gani Tondou et al., 2025](#)). Qualitatively, focus group discussions revealed that regular, culturally tailored SMS and voice messages mitigated common barriers of forgetfulness and logistical planning ([Dalatou et al., 2024](#)). Participants further reported that confidential digital interactions with peer educators reduced perceived stigma, building confidence for facility visits. One participant noted, “The phone let me ask questions I was too ashamed to say aloud at the clinic first,” a finding consistent with literature on technology providing a shielded space for sensitive health discussions ([Burrell, 2024](#); [Schritt, 2024](#)).

Administrative data from the Nigerien Ministry of Public Health corroborate these findings, showing increased rates of skilled birth attendance and institutional deliveries among adolescents in intervention zones. This is critical in a setting with high maternal morbidity ([Massi Idrissa et al., 2024](#)). The data suggest that practical digital literacy components, such as using mobile devices for

navigation and emergency transport, helped address the “last-mile” gap between antenatal care and safe delivery ([Adika & Ukoba, 2025](#)).

However, the benefits were not equitably distributed. A gradient of access emerged, where girls from lower socio-economic households faced intermittent disconnection due to airtime and electricity constraints, highlighting how infrastructure deficits undermine digital health equity ([Legotlo & Mhele, 2025](#); [Umoru & Gwarzo, 2025](#)). Furthermore, qualitative insights indicated that in cases where a male partner or mother-in-law controlled the primary household phone, the adolescent’s access to information was often mediated or restricted, demonstrating how patriarchal structures can limit technology’s empowering potential ([Abba Kaka et al., 2025](#); [Al-Ruzzieh et al., 2024](#)).

Thus, while the integrated intervention demonstrably improved key maternal health indicators through enhanced knowledge, reduced stigma, and logistical support, the case data underscore that technology alone is insufficient without addressing structural socio-economic and gendered barriers ([Conrad et al., 2024](#); [Silverman et al., 2025](#)).

## DISCUSSION

The discussion synthesises key findings that mobile phone ownership and digital literacy significantly influence maternal health service utilisation among adolescent girls in Niger, yet the precise mechanisms and contextual factors require careful interpretation ([Adika & Ukoba, 2025](#)). Our quantitative analysis demonstrates that digitally literate adolescents with mobile access were 2.3 times more likely to utilise key antenatal and postnatal services, aligning with broader evidence linking digital access to improved health-seeking behaviours in low-resource settings ([Silverman et al., 2025](#); [Conrad et al., 2024](#)). This relationship is not automatic, however, and is mediated by intersecting social and infrastructural factors. Qualitative insights reveal that digital literacy empowers adolescents to seek information and navigate health systems but also exposes them to misinformation and reinforces existing social hierarchies, complicating the pathway to service use ([Schritt, 2024](#); [Bulcha et al., 2024](#)).

The positive association found in this study is consistent with research from similar contexts ([Al-Ruzzieh et al., 2024](#)). For instance, studies on health information utilisation underscore that digital literacy is a critical determinant of whether mobile access translates into tangible health action ([Al-Ruzzieh et al., 2024](#); [Odlum, 2024](#)). Furthermore, our finding that social support networks amplify the benefits of mobile use echoes work on contraceptive decision-making among married adolescent girls in Niger, which highlights the role of social intermediaries in health behaviour ([Silverman et al., 2025](#)). However, our results diverge from perspectives that view technology adoption as a straightforward solution. The infrastructural and socio-economic constraints documented in Niger, such as unstable network connectivity, cost barriers, and low baseline digital skills, critically limit the potential of mHealth interventions ([Abubakar et al., 2024](#); [Massi Idrissa et al., 2024](#)). This contextual divergence underscores that mobile phone ownership alone is insufficient without parallel investments in digital skills training and reliable, contextually relevant health content ([Adika & Ukoba, 2025](#); [Umoru & Gwarzo, 2025](#)).

A key contribution of this analysis is elucidating the contextual mechanisms that underpin these relationships ([Aluda et al., 2025](#)). The qualitative data reveal that digital literacy facilitates a sense of agency and private information-seeking, which is particularly valuable for adolescents facing stigma ([Legotlo & Mhele, 2025](#)). Conversely, the digital divide can exacerbate existing inequalities, as girls from poorer households or rural areas are less likely to overcome these compounded barriers ([Dalatou et al., 2024](#); [Gani Tondou et al., 2025](#)). Therefore, the observed 2.3-fold increase in likelihood represents a potential achievable under enabling conditions, not a universal outcome. This nuanced understanding addresses gaps in the existing literature, which often notes the correlation but fails to unpack the ‘how’ and ‘for whom’ in the Sahelian context ([Ikogho & Onoharigho, 2025](#); [Varoda & Venugopal, 2025](#)).

Ultimately, this study argues for integrated interventions that combine device access with comprehensive digital health literacy programmes tailored for adolescents, while simultaneously strengthening the health system's responsiveness ([Angela, 2025](#)). Future research should employ longitudinal designs to track the sustained impact of digital inclusion on health outcomes across the reproductive life course ([Burrell, 2024](#); [YANG et al., 2025](#)).

## CONCLUSION

This case study, conducted from 2023 to 2024, has elucidated the critical, interdependent roles of mobile phone access and digital literacy in shaping maternal health service utilisation among adolescent girls in Niger. The findings robustly confirm that while mobile phone ownership provides a foundational opportunity, it is insufficient alone to overcome profound structural barriers ([Bulcha et al., 2024](#)). True efficacy is unlocked only when access is coupled with targeted digital literacy, enabling adolescents to navigate health information and engage with digital health tools effectively ([Adika & Ukoba, 2025](#); [Legotlo & Mhele, 2025](#)). In the Nigerien context, characterised by entrenched geographical and financial constraints, such digitally-facilitated pathways can mitigate traditional access barriers by providing critical information on service locations and antenatal care schedules ([Massi Idrissa et al., 2024](#); [Sanda et al., 2025](#)).

The primary contribution of this work lies in its nuanced framing of digital inclusion as a social determinant of adolescent maternal health in a low-resource, Sahelian setting. It moves beyond a techno-optimistic view to reveal that without concurrent investment in competency-building, mobile health (mHealth) initiatives risk exacerbating existing digital inequalities ([Schritt, 2024](#); [Umoru & Gwarzo, 2025](#)). This evidence is pertinent for policymakers across the Sahel, where demographic pressures and poor maternal health indicators demand innovative solutions ([Abba Kaka et al., 2025](#); [Abubakar et al., 2024](#)).

Consequently, this analysis leads to two concrete, intertwined policy recommendations. First, there is a compelling case for public-private partnerships to develop subsidised mobile phone and data schemes targeted at adolescent girls in rural and peri-urban communities ([Aluda et al., 2025](#)). Second, and of equal importance, is the systematic integration of foundational digital and health literacy into national secondary school and community-based curricula ([Abubakar, 2025](#); [Varoda & Venugopal,](#)

[2025](#)). Such education must extend beyond operational skills to include the critical evaluation of online health information.

While this study has mapped key pathways, it also illuminates critical gaps for future research. A paramount next step is longitudinal investigation into the long-term clinical impact of these digital interventions on maternal and neonatal outcomes ([Gani Tondou et al., 2025](#); [Silverman et al., 2025](#)). Furthermore, qualitative exploration is needed to understand the role of familial and community gatekeepers in mediating adolescent girls' use of mHealth resources ([Conrad et al., 2024](#); [Dalatou et al., 2024](#)). Future studies should also rigorously evaluate the specific design features—such as voice-based messaging in local languages—that maximise engagement and effectiveness within the Nigerian context ([Burrell, 2024](#); [Odlum, 2024](#)).

In conclusion, this case study posits that improving adolescent maternal health in Niger is inextricably linked to the nation's digital inclusion agenda. Mobile technology, when paired with the requisite literacy, represents a transformative asset for health system strengthening and individual empowerment. The challenge now is to translate this evidence into coordinated, cross-sectoral action that ensures the digital revolution is deliberately leveraged to secure the health and agency of the most vulnerable.

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