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Digital Exclusion and Social Inequity: A Global Narrative Review of Access to Education, Healthcare, and the Digital Economy

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ABSTRACT: Digital inequality is a growing concern that contributes significantly to socioeconomic disparities in education, healthcare, and economic participation. This narrative review aims to explore the structural and systemic dimensions of digital inequality and its implications for marginalized communities. Literature was sourced from databases including Scopus, PubMed, and Google Scholar using a combination of targeted keywords and Boolean search techniques. Articles were selected based on relevance, methodological diversity, and contextual alignment. The review identifies critical themes, including the impact of unequal digital access on educational attainment, disparities in telehealth usage, and limited economic opportunities in digitally excluded populations. Findings reveal that regions with weak digital infrastructure and low digital literacy consistently report lower educational performance, reduced health engagement, and limited employment prospects. Public policy, infrastructure investment, and digital training emerge as decisive factors that either mitigate or exacerbate these challenges. The discussion emphasizes the necessity of equitable digital policy design, community-based interventions, and collaborative global strategies to ensure inclusive digital development. Despite growing research on digital inequality, gaps remain in longitudinal analysis and intersectional perspectives. This review recommends future studies to adopt multidimensional frameworks to better inform policy and practice. In conclusion, addressing digital inequality is not only a technological necessity but also a social imperative. Bridging the divide is essential for creating a more just, inclusive, and resilient society in the digital era.

Keywords: Digital Inequality, Socioeconomic Disparity, Digital Literacy, Education Gap, Telehealth Access, Digital Infrastructure, Inclusive Digital Policy.

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INTRODUCTION

Digital inequality has emerged as one of the most pressing social challenges in the age of technological advancement, often serving as a barrier to socioeconomic development. Digital inequality refers to disparities in access, usage, and the capacity to benefit from information and communication technologies (ICTs). Scholars have identified two primary dimensions of digital inequality: access inequality and competence inequality (Perera et al., 2023). Access inequality

pertains to the uneven availability of digital infrastructure, such as broadband connectivity and functional devices. Competence inequality, meanwhile, involves the varying abilities of individuals to use technology effectively, shaped by education, socioeconomic status, and community support.

Over the past decade, the rapid pace of digitalization has intensified existing social and economic disparities. Despite the promises of inclusive growth through digital transformation, new technologies have disproportionately benefited already advantaged populations, thereby exacerbating inequality. In healthcare, digital innovations have increased service efficiency, but their benefits remain concentrated among economically privileged groups (Rich et al., 2019; Ahmed et al., 2020). Consequently, the design of digital policies must address social, cultural, and economic variables to mitigate unintended exclusionary effects (Safavi et al., 2022).

Empirical studies underscore the disproportionate impact of digital inequality on vulnerable groups, including residents of marginalized geographic areas and individuals from diverse demographic backgrounds. Bokhari and Awuni (2023) noted that minority populations with limited access to digital healthcare services tend to experience poorer health outcomes. Similarly, during the COVID-19 pandemic, digital education exacerbated disparities, leaving students from low-income households struggling to adapt to online learning environments (Goudeau et al., 2021).

Digital inequality is not exclusive to developing nations. Even in advanced economies, rural populations face challenges accessing digital healthcare services. Meanwhile, urban dwellers often lack the digital literacy or financial means to utilize these services effectively (Perzynski et al., 2017). Educational disparities stemming from unequal digital access further reinforce social stratification and hinder long-term social mobility (Katz et al., 2017).

To combat digital inequality, targeted interventions are crucial. Strategies should focus on enhancing infrastructure, building digital competencies, and formulating inclusive policies that prioritize the involvement of disadvantaged communities (Standaar et al., 2025). Evidence suggests that when communities invest in digital capacity-building, significant improvements in individual health and economic outcomes follow (Qin et al., 2023; Jacobs et al., 2017).

Gender is another critical lens through which digital inequality manifests. Women often encounter more barriers to technology access than men, limiting their personal and professional development. Empowerment initiatives that promote women's digital inclusion can help bridge these gaps (Christiani et al., 2015). Similarly, studies have highlighted the adverse effects of digital disparities on children and adolescents, calling for more inclusive approaches in digital education policy (Katz et al., 2024).

Digital inequality not only impedes individual advancement but also undermines a nation's broader socioeconomic progress. Addressing this issue requires inclusive and responsive policies involving stakeholders across sectors. These initiatives must aim for digital equity, ensuring all individuals have equal opportunities to leverage technological advancements, regardless of their socioeconomic background (Calleros et al., 2023).

Research on the interplay between digital and socioeconomic inequality faces several methodological and conceptual challenges. Firstly, digital inequality is a multidimensional

construct involving not only infrastructure but also user capabilities and social context. This complexity necessitates an interdisciplinary approach that incorporates economic, social, and technological perspectives (Perera et al., 2023). Moreover, cross-national differences in cultural and policy frameworks further complicate the analysis of digital inequality (Rich et al., 2019).

Many existing studies emphasize quantitative data, often neglecting the qualitative dimensions of digital inequality. Surveys and statistical models, while valuable, fail to capture the lived experiences of marginalized individuals navigating digital exclusion (Ahmed et al., 2020). Without robust qualitative insights, it is difficult to fully understand how digital disparities intersect with broader socioeconomic disadvantages (Feng & Xie, 2014).

The scarcity of longitudinal data also hampers a nuanced understanding of how digital inequality evolves over time. Most research is cross-sectional, providing only a snapshot of the issue. This limits our ability to track dynamic interactions between digital and socioeconomic variables and to evaluate the long-term effectiveness of policy interventions (Perzynski et al., 2017).

The measurement of digital inequality varies across national contexts. In developing countries, assessments often focus on basic infrastructure access, such as internet connectivity and device ownership. For example, studies in Bangladesh have linked digital health access to infrastructure availability and local training programs, noting that lower-educated populations are frequently excluded (Ahmed et al., 2020). In contrast, developed nations like the United Kingdom emphasize variables such as digital literacy and technology utilization in broader contexts, including health and well-being (Rich et al., 2019).

Digital inequality in high-income countries is increasingly assessed through indicators like smartphone usage and digital literacy, which significantly influence access to digital resources (Perzynski et al., 2017). Qualitative methods, including interviews and focus groups, offer deeper insights into how individuals interact with technology within their social contexts (Ahmed et al., 2020). Such approaches are essential for capturing the full spectrum of digital inequality (Perera et al., 2023).

There is a clear need for a narrative review that synthesizes current knowledge on the link between digital and socioeconomic inequality. While quantitative studies provide valuable metrics, they often fall short of explaining broader social implications. A narrative review allows for a holistic perspective that integrates diverse findings and explores how digital inequality affects socioeconomic outcomes in specific contexts (Ahmed et al., 2020; Feng & Xie, 2014).

Moreover, a narrative synthesis can enhance our understanding of how public policies and social initiatives can more effectively address digital disparities. By mapping existing research, such reviews identify patterns and relationships often overlooked in isolated studies, thereby informing more integrated and context-sensitive policy recommendations (Perzynski et al., 2017). This is particularly critical for addressing the needs of marginalized populations, such as women, indigenous communities, and those with low socioeconomic status, who are disproportionately affected by digital exclusion (Feng & Xie, 2014).

In sum, conducting a narrative review on digital and socioeconomic inequality is not only academically warranted but also practically essential. This approach will contribute both to theoretical advancements and to the development of actionable, policy-driven solutions aimed at fostering equity in digital access and usage. Through a multidisciplinary and inclusive lens, this review endeavors to support the creation of a more just and equitable digital society (Perzynski et al., 2017).

The scope of this review focuses on the intersection of digital and socioeconomic inequality across various population groups, particularly those most vulnerable to exclusion. Special attention is given to geographic disparities between urban and rural areas, gender-based barriers, and the challenges faced by low-income communities. By integrating global and localized evidence, this review seeks to present a comprehensive account of digital inequality as both a symptom and a driver of broader socioeconomic disparities.

METHOD

This study employed a narrative review methodology to examine the complex relationship between digital inequality and socioeconomic disparities. The process of literature collection was grounded in systematic yet flexible strategies, aimed at capturing the multidimensional aspects of digital inequality across a variety of socioeconomic contexts. To ensure the comprehensiveness and relevance of the literature included, searches were conducted across three primary academic databases: Scopus, Google Scholar, and PubMed. These databases were chosen for their extensive coverage of multidisciplinary peer-reviewed publications, which allowed access to relevant literature from fields such as public health, education, sociology, and digital technology.

The keyword selection was critical to guiding the search process. A combination of specific and broad terms was used to capture the nuanced connections between digital inequality and various forms of social and economic exclusion. The keywords included "digital inequality", "socioeconomic disparity", "healthcare access", "education gap", and "digital literacy". These terms were strategically combined using Boolean operators such as AND, OR, and NOT to either narrow or broaden the scope of the search. For instance, queries such as "digital inequality" AND ("socioeconomic disparity" OR "healthcare access" OR "education gap" OR "digital literacy") enabled the identification of studies that addressed digital inequality in relation to one or more domains of socioeconomic concern. Similarly, combinations like "socioeconomic disparity" AND "healthcare access" AND ("digital literacy" OR "education gap") were utilized to target intersections of health and education within digital contexts. Quotation marks were applied to ensure exact phrase matching and reduce irrelevant results, as recommended in previous digital divide literature (Rich et al., 2019).

In addition to Boolean logic, metadata-based filtering techniques were employed to enhance the specificity of the search. Filtering was applied to publication years, language (English only), and article type (peer-reviewed journal articles). The selection process prioritized publications from 2015 onwards, capturing the most recent developments in the field, especially those influenced by

the rapid digital transitions spurred by the COVID-19 pandemic and corresponding policy responses.

The inclusion and exclusion criteria were designed to balance breadth and depth in the synthesis of literature. Inclusion criteria were defined to ensure that only studies with relevant scope, methodological rigor, and contextual diversity were incorporated. To begin with, all included studies had to explicitly discuss digital inequality within the framework of socioeconomic disparity, focusing on domains such as healthcare, education, or digital skill development (Ahmed et al., 2020). Articles were also required to reflect methodological diversity, incorporating quantitative surveys, qualitative interviews, or mixed-method designs, to provide a comprehensive understanding of the phenomena under investigation (Ball et al., 2017). Furthermore, only recent publications, primarily within the last ten years, were considered to ensure that findings reflected contemporary issues and technological contexts (Perera et al., 2023).

The exclusion criteria were equally important to maintain the academic integrity and relevance of the review. Articles were excluded if they did not directly address the relationship between digital inequality and socioeconomic outcomes or if they lacked empirical grounding. This was particularly crucial in eliminating speculative or opinion-based pieces that did not contribute to the evidence-based discourse. Additionally, articles from non-peer-reviewed or predatory journals were omitted to ensure quality control. The review also excluded studies with poor methodological transparency, such as those failing to clearly describe their data sources or analytic procedures (Perzynski et al., 2017).

To manage the literature selection process systematically, a two-phase screening strategy was adopted. In the first phase, article titles and abstracts were reviewed to determine preliminary relevance based on the inclusion criteria. In the second phase, the full texts of potentially relevant articles were obtained and assessed against the criteria to confirm their suitability. During this process, duplicates were removed, and only the most representative and methodologically sound studies were retained.

Each article selected for the review was evaluated for its contribution to one or more thematic domains of interest, including digital access, digital literacy, educational outcomes, healthcare disparities, and socioeconomic marginalization. This thematic coding allowed for the identification of cross-cutting patterns and insights. Where possible, comparisons were drawn between findings from developed and developing country contexts, enabling a globally contextualized understanding of the digital divide.

The studies ultimately included in the review varied in design and methodology. Quantitative studies provided statistical associations between indicators of digital inequality and health or education outcomes. These included large-scale surveys, population-based studies, and regression-based analyses. Qualitative research, on the other hand, offered narrative accounts and experiential insights into how individuals and communities perceive and navigate digital exclusion. Such studies frequently employed interviews, focus groups, and ethnographic observations. Mixed-method studies were particularly valuable as they bridged empirical data with contextual interpretation, offering layered understanding (Ball et al., 2017).

Throughout the review process, emphasis was placed on identifying not only the presence of digital inequality but also the systemic and policy-related factors that perpetuate or mitigate it. Attention was paid to studies that examined gender disparities, urban-rural divides, generational gaps, and issues of affordability and infrastructure development. Special effort was made to include literature that addressed the implications of digital exclusion for marginalized groups such as women, children, older adults, low-income households, and indigenous populations.

In synthesizing the findings, the selected literature was grouped into thematic categories aligned with the aims of the review. These categories included access to digital infrastructure, digital literacy and skill development, impacts on healthcare and education, and systemic challenges. Each study was contextualized within its geographical and sociopolitical setting to highlight variations in the manifestation and implications of digital inequality. Global comparisons were drawn to contrast high-income and low-income contexts, revealing how structural differences in governance, infrastructure, and policy affect the digital divide.

This methodological approach facilitated a comprehensive, multi-perspective review of the digital divide and its intersection with socioeconomic disparity. By employing a rigorous search strategy, well-defined inclusion and exclusion criteria, and a thematic synthesis process, this study contributes to the growing body of knowledge on digital inequality. It provides a robust foundation for informing future empirical research and policy development aimed at addressing these disparities in a targeted and context-sensitive manner (Safavi et al., 2022).

RESULT AND DISCUSSION

The literature reviewed provides a comprehensive understanding of how digital inequality contributes to broader socioeconomic disparities, particularly in the domains of education, healthcare, and economic participation. Findings from diverse geographical and demographic contexts reveal consistent patterns indicating that unequal access to technology, combined with disparities in digital skills, leads to cumulative disadvantages. Thematic analysis of the literature resulted in three central themes, each representing a major area of impact: access to digital education, access to digital healthcare services, and participation in the digital economy including cybersecurity awareness.

Access to Digital Education

The impact of digital inequality on educational outcomes is well-documented, particularly for students from low socioeconomic backgrounds. Ball et al. (2017) demonstrated that students residing in digitally underserved communities consistently perform worse academically. The lack of access to stable internet connections, appropriate devices, and educational software hinders students' ability to engage fully in digital learning environments. This "digital scholarship gap" disproportionately favors students from affluent families who can afford better digital tools and environments, perpetuating cycles of educational disadvantage (Perera et al., 2023).

The COVID-19 pandemic intensified these disparities as educational systems globally shifted to online learning. During this transition, students from low-income households faced significant challenges, including shared devices, limited broadband, and absence of parental support due to parents' lack of digital literacy or time (Goudeau et al., 2021). These factors severely restricted their participation in digital classrooms and often led to lower engagement and performance.

Efforts to bridge the digital divide in education have varied across contexts. Programs such as "One Laptop per Child" illustrate attempts to democratize access by providing digital devices and connectivity to students in low-resource settings. However, the success of such interventions depends heavily on infrastructure readiness and the availability of technical support. Perzynski et al. (2017) argue that equitable digital education requires more than device provision. It also demands comprehensive teacher training, integration of digital tools into pedagogical practices, and ongoing digital literacy development among students.

Furthermore, supportive learning environments facilitated through peer mentorship and virtual guidance have been shown to reduce the digital engagement gap in STEM fields, particularly for students from marginalized backgrounds (Ahmed et al., 2020). These findings highlight the importance of fostering not just access, but also agency and motivation among digitally excluded students.

Access to Digital Healthcare Services

Access to digital healthcare has become increasingly vital, particularly as telehealth and digital consultations expand worldwide. Nonetheless, the digital divide continues to obstruct equitable health service delivery. Studies such as those by Safavi et al. (2022) and Qin et al. (2023) have found that individuals in wealthier, urbanized areas are more likely to use telemedicine services compared to those in low-income or rural areas. Infrastructure limitations, including poor broadband availability and lack of digital devices, significantly constrain access to digital health solutions.

Moreover, digital literacy acts as both a barrier and a facilitator in navigating digital health services. Perzynski et al. (2017) emphasized that individuals with higher levels of digital literacy are more likely to utilize telehealth services, engage with health monitoring apps, and understand electronic medical information. Conversely, individuals with low digital literacy—commonly found among older adults, less-educated individuals, and rural populations—are often excluded from these advancements. As a result, health inequalities may be exacerbated instead of reduced.

Programs aimed at enhancing digital literacy within communities have shown promise. Community-based workshops, mobile digital health units, and collaborations between public libraries and health organizations are examples of inclusive strategies that increase awareness and competency in using digital health technologies. These initiatives not only improve patient engagement but also foster trust in digital systems, which is essential for long-term health outcomes.

Additionally, disparities in language, cultural perceptions of technology, and trust in digital health systems further affect utilization rates. Thus, to fully address digital health inequality, interventions

must be tailored to specific populations, considering their unique social and cultural contexts. This includes providing multilingual interfaces, culturally competent digital health education, and ensuring confidentiality in telehealth environments.

Economic Participation and Cybersecurity

In the realm of economic participation, digital inequality restricts access to job markets, entrepreneurial opportunities, and financial technologies. The inability to access digital platforms undermines individuals' ability to apply for jobs, participate in remote work, or utilize online marketplaces. Khan et al. (2023) and Ishmuradova et al. (2024) argue that digital exclusion disproportionately affects those in lower socioeconomic strata, as they lack not only access to technology but also the skills to leverage it effectively for economic advancement.

This exclusion has become particularly salient in the post-pandemic economy, where remote work and digital entrepreneurship have gained prominence. Individuals without reliable internet or devices are often excluded from these labor segments. Moreover, access to platforms that support e-commerce or freelance services remains limited for many individuals in rural or underserved urban areas. Without targeted interventions, this could lead to a widening of income inequality and digital class divisions.

Cybersecurity awareness is another dimension where digital inequality manifests. Khan et al. (2023) observed that individuals from lower socioeconomic backgrounds have limited understanding of cybersecurity threats, making them more vulnerable to scams, identity theft, and data breaches. This lack of awareness is compounded by the absence of formal education on cybersecurity practices and limited access to trustworthy information sources.

Currás et al. (2021) highlighted that digital insecurity can discourage users from engaging with digital services altogether, thereby further deepening the divide. A lack of confidence in online systems can result in avoidance behavior, where users prefer offline services even when digital alternatives are more efficient or accessible. Addressing these challenges requires targeted cybersecurity training programs, particularly for users from disadvantaged backgrounds. Such initiatives should focus on basic threat identification, safe browsing practices, and data protection strategies.

In comparing global responses to these challenges, some countries have pioneered digital inclusion policies that integrate economic empowerment with cybersecurity training. For instance, Singapore's Digital Readiness Blueprint includes targeted outreach to low-income groups, combining access provision with education on digital safety and skill development. In contrast, many lower-income countries still struggle with foundational access issues, let alone advanced training in digital security.

These international contrasts underscore the need for context-sensitive approaches. While infrastructure development is a necessary first step, it is not sufficient. Sustainable solutions require multi-layered strategies that incorporate access, literacy, confidence-building, and cultural adaptation.

In conclusion, the literature reviewed reveals that digital inequality is a multidimensional issue that affects education, health, and economic domains in interconnected ways. The impacts are particularly pronounced among marginalized populations, including low-income households, rural communities, women, and ethnic minorities. Bridging the digital divide thus demands integrated policy approaches that go beyond infrastructure provision to include digital literacy, community engagement, and tailored support systems.

Through cross-national comparison and thematic synthesis, this review affirms that digital inequality is both a symptom and a driver of broader social inequalities. Addressing this issue is not merely a technological challenge but a social imperative, requiring coordinated action across sectors and levels of governance. The findings presented here offer a strong foundation for developing inclusive digital policies that ensure equitable access and participation for all members of society.

The findings of this narrative review underscore the multifaceted nature of digital inequality and how structural factors such as public policy, digital infrastructure, and technological literacy contribute to the entrenchment of socioeconomic disparities. These systemic determinants function not only as barriers to equitable access but also as levers through which inclusive digital transformation can be achieved. The discussion that follows integrates literature-based evidence with the thematic insights presented in the results section to contextualize these dynamics and explore their broader policy and research implications.

Public policy plays a pivotal role in either amplifying or mitigating digital inequality. Policies governing education and healthcare access, in particular, determine the extent to which digital technologies become tools for inclusion or exclusion. When policymakers fail to account for the unique needs of marginalized populations, digital infrastructure investments risk reinforcing existing inequalities. Rich et al. (2019) observed that government inaction or underinvestment in rural connectivity often leaves peripheral communities digitally disenfranchised. Conversely, when governments proactively introduce subsidies for internet installation in underdeveloped regions or promote digital literacy training among low-income households, the likelihood of inclusive digital engagement increases substantially.

The analysis by Perera et al. (2023) further supports the notion that strong digital infrastructure correlates with better educational and health outcomes. Schools and clinics in regions with reliable internet access and digital tools are better equipped to deliver services, thereby enhancing opportunities for upward mobility. However, the unequal distribution of infrastructure creates a fragmented digital landscape, wherein quality of access—and therefore quality of opportunity—varies significantly by geography and social class. This geographic and economic digital divide has been recognized globally, highlighting the need for policies that are responsive to local infrastructural deficits and community-specific challenges.

Technological literacy constitutes another fundamental axis of digital inequality. As Wilkens et al. (2024) suggest, digital literacy is not merely a matter of technical skill but also involves critical engagement with digital content, the ability to evaluate information, and the confidence to participate in digital spaces. Ball et al. (2017) emphasized that students and adults with low digital

literacy are often unable to fully leverage educational or health technologies, thus becoming trapped in a cycle of exclusion. Bridging this gap requires the integration of digital training into broader social programs—particularly those targeting education, healthcare, and workforce development.

Community-based interventions are among the most promising mechanisms for delivering digital literacy training, especially when facilitated through trusted local institutions such as libraries, schools, and community centers (Standaar et al., 2025). These programs often function as both educational and social support hubs, helping participants build digital competencies while fostering a sense of belonging and civic participation. Nevertheless, such initiatives must be context-sensitive and tailored to the linguistic, cultural, and socioeconomic characteristics of target populations to ensure their effectiveness.

The implications of digital inequality for policy design are profound. At the national level, inclusive digital strategies must go beyond technical solutions and incorporate social equity goals. Policies should be co-designed with marginalized groups, ensuring that interventions address real-world constraints and lived experiences. Standaar et al. (2025) highlighted that initiatives involving community participation tend to be more successful in sustaining long-term engagement, as they generate local ownership and responsiveness. At the international level, collaboration across nations—particularly between high-income and low- and middle-income countries—is crucial for sharing best practices, technologies, and scalable policy frameworks (Ahmed et al., 2020).

Multilateral institutions and international NGOs also have a role to play in supporting digital inclusion efforts. Through technical assistance, financial support, and capacity-building programs, these actors can help developing nations implement context-appropriate solutions. Yet, global efforts must avoid one-size-fits-all approaches and instead focus on adaptive learning and knowledge exchange, recognizing the diversity of digital ecosystems and governance environments across countries.

A major challenge in aligning digital transformation with social justice lies in stakeholder resistance. Some policymakers and institutions underestimate the severity of digital inequality or lack awareness of its cascading impacts. Ahmed et al. (2020) and Ucar et al. (2021) noted that data-driven understandings of inequality often fail to capture the day-to-day struggles of digitally excluded individuals. As a result, interventions may remain superficial, addressing symptoms without tackling root causes. Enhancing stakeholder awareness through participatory research, storytelling, and grassroots advocacy can help bridge this gap.

Another complicating factor is the rapid pace of technological change. Many of the solutions proposed to bridge the digital divide become outdated before they are implemented, especially in bureaucratic systems that are slow to respond to innovation. Ball et al. (2017) and Perzynski et al. (2017) caution that policy inertia and lack of institutional agility often render well-meaning initiatives obsolete or ineffective. Policymaking in the digital age therefore demands anticipatory governance models that prioritize flexibility, foresight, and cross-sector collaboration.

Moreover, digital inequality is not a static condition; it evolves in tandem with broader socioeconomic trends. The emergence of artificial intelligence, big data analytics, and platform-

based economies introduces new layers of exclusion for those without the requisite digital fluency or access to emerging technologies. Consequently, efforts to address digital inequality must be forward-looking and inclusive of future skills development, especially for youth and vulnerable workers.

This review also highlights significant gaps in the existing literature. Much of the research on digital inequality remains siloed, focusing on either access or usage without adequately exploring the interplay between infrastructure, literacy, and socio-political context. Furthermore, there is a dearth of longitudinal studies that track how digital inequality evolves over time and in response to policy interventions. Perzynski et al. (2017) emphasize the importance of longitudinal data in assessing the sustainability of digital inclusion efforts and identifying the conditions under which progress stalls or reverses.

Research is also limited in its ability to capture intersectional dimensions of digital inequality. While many studies address economic status or geographic location, fewer explore how digital exclusion is shaped by intersecting factors such as gender, disability, age, and ethnicity. Garcia-Saisó et al. (2024) stress the importance of inclusive research frameworks that reflect the full diversity of affected populations. Future studies must prioritize intersectional analysis to ensure that policy responses are attuned to the realities of the most marginalized groups.

In light of these findings, it is clear that digital inequality is not simply a matter of lacking devices or internet connectivity. It is a complex socio-technical problem that reflects and reinforces broader systems of privilege and disadvantage. Addressing it requires systemic change—an overhaul of how technology is developed, distributed, and governed, and a commitment to placing equity at the center of digital innovation.

Policymakers, researchers, and civil society actors must therefore adopt a multidimensional approach to digital inclusion. This includes investing in infrastructure, building digital capabilities, enabling participatory governance, and fostering inclusive innovation ecosystems. Only through such comprehensive efforts can we move toward a digital future that is truly equitable and accessible for all.

CONCLUSION

This narrative review has highlighted the significant role of digital inequality in perpetuating socioeconomic disparities across education, healthcare, and economic participation. Findings consistently demonstrate that unequal access to digital infrastructure and insufficient digital literacy are critical barriers for marginalized communities. These structural inequities not only hinder access to quality education and healthcare but also limit opportunities for economic empowerment and protection against cybersecurity risks. Systemic factors such as policy design, infrastructure development, and the availability of digital training programs significantly influence the severity of these disparities.

The discussion underscores the urgent need for holistic and inclusive policy interventions that are sensitive to local contexts and responsive to community needs. Investment in digital infrastructure,

particularly in underserved regions, must be paired with digital literacy programs embedded in educational and community institutions. Furthermore, multi-stakeholder collaboration—including governments, civil society, and private sector actors—is essential to ensure scalable and sustainable solutions.

Given the evolving nature of digital technologies, future research should employ longitudinal and intersectional approaches to better capture the changing dynamics of digital inequality. Special attention must be given to how digital exclusion intersects with gender, age, ethnicity, and geography. Ultimately, bridging the digital divide requires systemic transformation that prioritizes equity, accessibility, and resilience in the digital age.

In practical terms, policymakers must prioritize digital infrastructure investment alongside capacity building in underserved areas. Theoretically, this review contributes to understanding digital inequality as a multidimensional challenge requiring intersectional and long-term analysis.

Future research should adopt longitudinal approaches and include intersectional variables such as gender, age, and disability to better inform inclusive digital policy.

To promote equitable access, policy recommendations include: (1) integrating digital literacy into national education curricula; (2) offering digital subsidies or device grants for low-income families; and (3) strengthening public-private partnerships for broadband expansion in rural areas.

REFERENCES

Ahmed, T., Rizvi, S., Rasheed, S., Iqbal, M., Bhuiya, A., Standing, H., & Waldman, L. (2020). Digital health and inequalities in access to health services in Bangladesh: Mixed methods study. *JMIR mHealth and uHealth, 8*(7), e16473. https://doi.org/10.2196/16473

Ball, C., Huang, K., Rikard, R., & Cotten, S. (2017). The emotional costs of computers: An expectancy-value theory analysis of predominantly low-socioeconomic status minority students' STEM attitudes. *Information, Communication & Society, 22*(1), 105–128. https://doi.org/10.1080/1369118X.2017.1355403

Bokhari, H., & Awuni, E. (2023). Digital inequalities in North Africa: Examining employment and socioeconomic well-being in Morocco and Tunisia. *Convergence: The International Journal of Research into New Media Technologies, 30*(3), 1149–1169. https://doi.org/10.1177/13548565231209673

Calleros, C., Guerrero-García, J., & González-Calleros, J. (2023). Addressing the digital divide with educational systems in Mexico: Challenges and opportunities. In *Proceedings* (pp. 347–375). https://doi.org/10.1007/978-981-99-7645-4_16

Christiani, Y., Byles, J., Tavener, M., & Dugdale, P. (2015). Assessing socioeconomic inequalities of hypertension among women in Indonesia's major cities. *Journal of Human Hypertension, 29*(11), 683–688. https://doi.org/10.1038/jhh.2015.8

Currás, M., Crespo, J., & Lera-López, F. (2021). Do educational inequalities affect internet use? An analysis for developed and developing countries. *Telematics and Informatics, 58*, 101521. https://doi.org/10.1016/j.tele.2020.101521

Feng, Y., & Xie, W. (2014). Digital divide 2.0: The role of social networking sites in seeking health information online from a longitudinal perspective. *Journal of Health Communication, 20*(1), 60–68. https://doi.org/10.1080/10810730.2014.906522

García-Saisó, S., Martí, M., Pesce, K., Luciani, S., Mújica, Ó., Hennis, A., & D'Agostino, M. (2024). Artificial intelligence as a potential catalyst to a more equitable cancer care. *JMIR Cancer, 10*, e57276. https://doi.org/10.2196/57276

Goudeau, S., Sanrey, C., Stanczak, A., Manstead, A., & Darnon, C. (2021). Why lockdown and distance learning during the COVID-19 pandemic are likely to increase the social class achievement gap. *Nature Human Behaviour, 5*(10), 1273–1281. https://doi.org/10.1038/s41562-021-01212-7

Ishmuradova, I., Chistyakov, A., Klebanov, L., Sliusar, V., Sliusar, M., Devyatkin, G., & Drobysheva, N. (2024). A decadal review of the role of communication-mobile technologies in promoting digital inclusion: Digital divide. *Online Journal of Communication and Media Technologies, 14*(3), e202438. https://doi.org/10.30935/ojcmt/14709

Jacobs, W., Amuta, A., & Jeon, K. (2017). Health information seeking in the digital age: An analysis of health information seeking behavior among US adults. *Cogent Social Sciences, 3*(1), 1302785. https://doi.org/10.1080/23311886.2017.1302785

Katz, M., Mszar, R., Grimshaw, A., Gunderson, C., Onuma, O., Lu, Y., & Spatz, E. (2024). Digital health interventions for hypertension management in US populations experiencing health disparities. *JAMA Network Open, 7*(2), e2356070. https://doi.org/10.1001/jamanetworkopen.2023.56070

Katz, V., González, C., & Clark, K. (2017). Digital inequality and developmental trajectories of low-income, immigrant, and minority children. *Pediatrics, 140*(Supplement 2), S132–S136. https://doi.org/10.1542/peds.2016-1758R

Khan, N., Ikram, N., & Saleem, S. (2023). Effects of socioeconomic and digital inequalities on cybersecurity in a developing country. *Security Journal, 37*(2), 214–244. https://doi.org/10.1057/s41284-023-00375-4

Perera, P., Selvanathan, S., Bandaralage, J., & Su, J. (2023). The impact of digital inequality in achieving sustainable development: A systematic literature review. *Equality, Diversity and Inclusion: An International Journal, 42*(6), 805–825. https://doi.org/10.1108/EDI-08-2022-0224

Perzynski, A., Roach, M., Shick, S., Callahan, B., Gunzler, D., Cebul, R., & Einstadter, D. (2017). Patient portals and broadband internet inequality. *Journal of the American Medical Informatics Association, 24*(5), 927–932. https://doi.org/10.1093/jamia/ocx020

Qin, J., Chan, C., Dong, J., Homma, S., & Ye, S. (2023). Telemedicine is associated with reduced socioeconomic disparities in outpatient clinic no-show rates. *Journal of Telemedicine and Telecare, 30*(9), 1507–1515. https://doi.org/10.1177/1357633X231154945

Rich, E., Miah, A., & Lewis, S. (2019). Is digital health care more equitable? The framing of health inequalities within England's digital health policy 2010–2017. *Sociology of Health & Illness, 41*(S1), 31–49. https://doi.org/10.1111/1467-9566.12980

Safavi, A., Lovas, M., Liu, Z., Melwani, S., Truong, T., Devonish, S., & Berlín, A. (2022). Virtual care and electronic patient communication during COVID-19: Cross-sectional study of inequities across a Canadian tertiary cancer center. *Journal of Medical Internet Research, 24*(11), e39728. https://doi.org/10.2196/39728

Standaar, L., Israel, A., Vaart, R., Keij, B., Friele, R., Beenackers, M., & Tuyl, L. (2025). Support in digital health skill development for vulnerable groups in a public library setting: Perspectives of trainers. *Frontiers in Digital Health, 6*, 1519964. https://doi.org/10.3389/fdgth.2024.1519964

Ucar, I., Gramaglia, M., Fiore, M., Smoreda, Z., & Moro, E. (2021). News or social media? Socio-economic divide of mobile service consumption. *Journal of the Royal Society Interface, 18*(185), 20210350. https://doi.org/10.1098/rsif.2021.0350

Wilkens, J., Thulesius, H., & Ekman, B. (2024). From office to digital primary care services: Analysing income-related inequalities in utilization. *International Journal for Equity in Health, 23*(1), 1–14. https://doi.org/10.1186/s12939-024-02184-6