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REVIEW ARTICLE

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Digital humanities: A review study of digital archives for sustainability and health equity

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ABSTRACT

This review article examines the transformative role of Digital Humanities (DH) in advancing sustainability and health equity through digital archives. While digital archives have traditionally served as cultural heritage repositories, this study demonstrates their strategic potential as critical infrastructures for addressing complex global challenges. The analysis reveals how DH principles fundamentally reshape archival practice, with ethical metadata transformation—using artificial intelligence, controlled vocabularies, and community-led methods—emerging as a powerful mechanism for redressing historical bias and enabling more accurate representation of marginalized groups. Key findings from the synthesis of 29 studies show inclusivity as the predominant principle, followed by accessibility (19 studies) and community engagement (15 studies). The evidence indicates that participatory design approaches yield culturally sensitive, multilingual interfaces that better serve underrepresented populations, while innovative taxonomy development and open-source platforms advance decolonizing archival practices. However, significant implementation challenges persist, including the digital divide, ethical concerns regarding data sovereignty, and constraints from legacy systems and limited resources. The review concludes that intentional application of DH methodologies to archival design substantially enhances digital archives' capacity to support both cultural sustainability and rigorous investigation into the structural dimensions of health equity, though more collaborative approaches are needed to fully realize this potential.

KEYWORDS: digital humanities, digital archives, sustainability, health equity, metadata design, user interface, community engagement, decolonizing practices

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Introduction

The Digital Humanities (DH) has undergone a profound evolution from its origins as a niche methodological specialization into a robust interdisciplinary field that is fundamentally reshaping how scholars create, preserve, and critically interrogate cultural records (Berry & Fagerjord, 2017). This transformation is driven by a shift from using computational tools merely to digitize analog materials toward leveraging them to construct dynamic, complex knowledge systems. At the forefront of this paradigm shift are digital archives, which have been re-imagined not as static digital repositories but as living infrastructures that facilitate novel forms of research, participatory storytelling, and broad public engagement. These archives are increasingly recognized as vital platforms for knowledge democratization and cultural preservation in the digital age.

Concurrently, the global community faces two interconnected and pressing challenges: the imperative for sustainability, as formally articulated in the United Nations' Sustainable Development Goals (SDGs), and the urgent, unmet need to achieve genuine health equity (UN, 2015). Both challenges demand innovative, cross-sectoral solutions that move beyond traditional disciplinary silos. This review posits that the domains of Digital Humanities, sustainability, and health equity are not merely adjacent but are deeply and productively intertwined. We argue that digital archives, when conceived and designed through a DH lens, can serve as powerful, dual-purpose instruments for advancing both agendas.

As critical infrastructure, digital archives contribute to **sustainability** in multifaceted ways. Environmentally, they promote sustainable research practices by reducing the carbon footprint associated with physical travel to archives and museums (Hedges & Dunn, 2017). More significantly, they are essential for **cultural and social sustainability**, acting as bulwarks against the loss of intangible heritage, endangered languages, and traditional knowledge systems that are increasingly threatened by globalization and climate change (Edmond, 2020; UNESCO, 2003). By safeguarding these diverse epistemologies, digital archives help ensure that a plurality of ways of knowing is preserved for future generations, thereby supporting a more resilient and intellectually diverse global society (Drucker, 2021; Goddard & Seeman, 2019).

In the realm of **health equity**, defined as the attainment of the highest level of health for all people, digital archives offer transformative potential (Braveman, 2014). Community-driven and ethically-designed archives can counter historical erasures and systemic biases by documenting the health histories and narratives of marginalized populations (Caswell & Mallick, 2022). They function as platforms for "counter-storytelling" that challenge dominant, often stigmatizing, medical narratives and provide a crucial, community-owned evidence base for understanding and addressing the social determinants of health (Mathieu & Martin, 2023; Noble, 2018). Furthermore, the large-scale digitization of historical public health records enables new computational analyses of the structural drivers of health disparities, from redlining to environmental racism, thereby informing more effective and equitable public health interventions (Klein, 2021; Rodriguez et al., 2020).

This article provides a comprehensive review of the current landscape at this fertile intersection. It synthesizes emerging evidence to demonstrate how DH principles and practices are being applied to the design of digital archives to simultaneously advance sustainability and health equity goals. The article is structured to first establish the theoretical and conceptual connections between these fields, then present a narrative review of key applications and case studies, and finally, analyze the significant challenges and promising future directions for this rapidly evolving area of scholarship and practice.

Research Questions

Primary Research Question:

How are Digital Humanities (DH) principles and methodologies being operationalized in the design and management of digital archives to advance goals of sustainability and health equity, and what are the associated outcomes and challenges?

Secondary Questions (aligned with the Methodology and Analysis):

1. **Methodology & Implementation:** What specific DH principles (e.g., inclusivity, accessibility, community engagement) are most frequently applied in the design of digital archives, and how are they implemented through specific technical and descriptive components like metadata schemas and user interfaces?
    - *Rationale:* This question directly mirrors the «Data Extraction» categories 1 (DH Principles Applied), 3 (Metadata Design), and 4 (UI/UX Design). The «Results» and «Analysis» sections systematically

report on these findings.

2. **Outcomes & Impact:** What are the reported or theorized impacts of these DH-informed archival designs on health equity outcomes, such as research accessibility, community engagement, and the redress of historical bias?
    - *Rationale:* This question is addressed by the «Data Extraction» category 5 (Health Equity Outcomes) and is a central theme of the «Results,» «Analysis,» and «Discussion» sections, which synthesize evidence of impact.
3. **Challenges & Enablers:** What are the predominant technical, ethical, and structural challenges (e.g., digital divide, data sovereignty, legacy systems) encountered in implementing these approaches, and what strategies have been proposed or used to mitigate them?
    - *Rationale:* This question is informed by the «Data Extraction» category 7 (Challenges and Solutions) and is a major focus of the «Analysis» and «Discussion» sections, which detail implementation barriers.
4. **Intersectionality & Context:** How do the applied DH principles and their implementation strategies vary across different types of archives (e.g., community collections, public health datasets) and different health equity contexts (e.g., racial justice, Indigenous sovereignty, disability)?
    - *Rationale:* This question connects the «Data Extraction» categories 2 (Archive Characteristics) and 5 (Health Equity Outcomes) with the thematic analysis in the «Results,» allowing for a nuanced understanding of how context shapes practice.

Methodology

1. Study Selection and Screening Protocol

A systematic literature review was conducted following established guidelines for knowledge synthesis in interdisciplinary research. The study selection process employed a two-stage screening protocol to ensure comprehensive and reproducible results.

- Information Sources and Search Strategy:
  A multi-database search strategy was implemented across major scholarly databases including Scopus, Web of Science, PubMed, IEEE Xplore, and ACM Digital Library. The search strategy combined controlled vocabulary (e.g., MeSH terms) and keywords related to three core concepts: ("digital humanities" OR "DH") AND ("digital archives" OR "digital repositories") AND ("health equity" OR "health disparities"). No date restrictions were applied to capture the full evolution of the field.
- Eligibility Criteria:
  Studies were assessed against the following pre-defined, structured criteria:
    - Content Focus: The study must examine digital archives containing health-related data, cultural materials, or narratives pertinent to health equity research.
    - Digital Humanities Integration: The study must explicitly discuss, apply, or critique Digital Humanities (DH) principles, methods (e.g., computational text analysis, network analysis, spatial humanities), or theoretical frameworks in the context of archive design or analysis.
    - Design Components: The study must address one or more core technical or descriptive components of archive design, specifically metadata schema (e.g., ontologies, taxonomies) and/or user interface (UI) design.
    - Impact Consideration: The study must examine, measure, or critically discuss the impact of the archive or its design on outcomes such as research accessibility, usability, discoverability, or equity.
    - Methodological Rigor: The study must employ a recognized research methodology, including empirical studies (qualitative, quantitative, mixed-methods), case studies, systematic reviews, or design-based research.
    - Scope Delimitation: The study›s focus must extend beyond clinical databases or electronic health records to include a distinct archival, cultural, or DH component.
    - Practical Application: The study must move beyond purely theoretical discussion to include the application or critical evaluation of DH concepts in the design, development, or implementation of an actual archive or a detailed prototype.
    - Publication Status: The source must be a peer-reviewed journal article, conference proceeding, or

book chapter.

The screening questions were applied holistically by two independent reviewers to determine a study's eligibility for inclusion, with a third reviewer resolving discrepancies.

2. Data Extraction and Synthesis

A structured data extraction process was designed to ensure consistency, comprehensiveness, and facilitate thematic synthesis.

- Extraction Tool and Process:
  A standardized data extraction form was developed and piloted. To enhance reliability and manage the volume of qualitative data, a large language model (LLM) was employed as an assistive tool. The LLM was provided with the full text of included studies and detailed, standardized prompts for each data category. All LLM extractions were subsequently verified and refined by a human reviewer to ensure accuracy and contextual understanding.
- Data Categories:
  1. DH Principles Applied: Specific DH methodologies, theories, and emphasized tenets (e.g., accessibility, inclusivity, community engagement, interdisciplinarity), including how they were operationalized.
  2. Archive Characteristics: Type of archive, subject matter, scope, target user communities, and technical infrastructure/platforms.
  3. Metadata Design Approach: Metadata schemas/standards, the incorporation of equity-focused elements, community involvement in design, and strategies for cultural sensitivity.
  4. UI/UX Design Features: Search and discovery functionalities, navigation, accessibility compliance, culturally-informed visual design, and multilingual support.
  5. Health Equity Outcomes: Reported impacts on research access, participation, discoverability, community engagement, and any quantitative or qualitative metrics of success.
  6. Implementation Process: Stakeholder engagement strategies, co-design methodologies, project timelines, and collaborative structures.
  7. Challenges and Solutions: Documented technical, community-related, resource, or institutional barriers and the corresponding mitigation strategies.
  8. Causal Mechanisms: Proposed or evidenced theoretical pathways linking DH principles to health equity outcomes.
  9. Study Design and Methodology: Classification of the research approach and specific analytical techniques employed.
- Synthesis Method:
  The extracted data was synthesized using a convergent qualitative synthesis approach. Findings across the data categories were integrated to identify overarching themes, patterns, and gaps in the literature regarding the role of DH in shaping equitable digital health archives.

Results

The included studies represent a diverse and evolving landscape of Digital Humanities (DH) scholarship focused on the intersection of digital archives, sustainability, and health equity. The analysis reveals several prominent thematic and methodological trends.

A significant number of studies apply core DH principles to address historical injustices and gaps in the archival record. For instance, Jaillant and Aske (2024) focus on the ethical complexities of providing access to digitized historical medical images, employing principles of accessibility and inclusivity to address the gender data gap. Similarly, projects led by Allard and Ferris (2016), Perine (2024), and Gaede et al. (2022) utilize participatory archiving, computational archival science, and decolonial DH methodologies, respectively. These projects are explicitly oriented towards social justice, aiming to recover hidden knowledge of Black, Indigenous, and other marginalized communities while challenging colonial and oppressive archival practices (Allard & Ferris, 2016; Meyer & Odumosu, 2020; Carbajal, 2021).

The context of health equity is a dominant focus, with many studies targeting specific health disparities.

Day (2020) and O'Driscoll and Bawden (2022) directly engage with racial health inequities, the former by organizing COVID-19 racial data through a Black Digital Humanities lens and the latter by applying Critical Race Theory to decolonize healthcare information in the UK National Health Service. Other studies address equity through the lens of inclusive design and accessibility. Portugal and Guimarães (n.d.), Co et al. (2023), and Gibson and Bowen (2019) explore creating bilingual narratives for deaf children, ensuring digital accessibility for people with disabilities, and designing inclusive health records for marginalized youth, demonstrating a commitment to procedural and informational equity.

Methodologically, the field is characterized by a strong emphasis on community-centered approaches. The principles of community engagement, participatory design, and inclusivity are ubiquitous across the corpus (Shiri et al., 2021a; Harrigan et al., 2018; Vigil-Hayes et al., 2024). This is evident in projects that co-create archives with communities, such as Indigenous digital storytelling systems (Shiri et al., 2021a, 2021b) and archives built using feminist and autoethnographic methodologies (Bailey, 2015; Staidum, 2022). The work of Niño Cáceres et al. (2024) on Afro-Colombian ancestral medicine further exemplifies this trend through its use of asset-based, pluriversal design.

A substantial sub-theme concerns the critical role of metadata and knowledge organization in advancing equity. Scholars are actively developing reparative and inclusive metadata practices to counteract colonial, racist, and cisnormative legacies in existing archival systems (Kord, 2022; Mizota, 2023; Alexander et al., 2025; Wagner et al., 2023). Efforts also extend to improving the discoverability and interoperability of health data (Shiri & Thornton, 2019; Rasberry & Mietchen, 2021) and ensuring diversity in foundational health datasets (Markatou et al., 2025; Franklin et al., 2020).

Finally, several studies leverage digital archives for contemporary public health crises and interventions. Tsui et al. (2025) and Tsui and Starecheski (2018) explore the use of oral history and digital storytelling archives to build public trust and preparedness, while Forrest et al. (2024) develop user-centered platforms for Social Determinants of Health data to directly address racial and ethnic health disparities.

In summary, the included literature demonstrates a concerted movement within Digital Humanities towards ethically-grounded, community-driven archival praxis that explicitly aims to rectify historical erasures, promote cultural sustainability, and serve as a tangible tool in the pursuit of health equity.

Analysis

The analysis of 40 studies reveals significant patterns in how Digital Humanities (DH) principles are being operationalized to advance health equity through digital archives. Our findings demonstrate both the evolving priorities of the field and the persistent challenges in implementing these principles effectively.

1. The Dominance of Foundational Ethical Principles

The high frequency of inclusivity (29 studies), accessibility (19 studies), and community engagement (15 studies) as applied principles indicates a strong ethical consensus within DH scholarship focused on health equity. These principles appear to serve as the foundational framework upon which more specialized approaches are built. However, the relatively lower occurrence of more transformative principles like decolonization (5 studies) and participatory approaches (7 studies) suggests that while the field recognizes the importance of ethical engagement, fully realized power-sharing models remain less common in practice. This distribution may reflect the methodological and institutional challenges of implementing truly decolonial frameworks within existing academic and archival structures.

2. Methodological Implementation Across Archive Types

The diverse range of archive types—from community collections to specialized health datasets—demonstrates the adaptability of DH methodologies across contexts. The significant number of studies (10) that did not specify archive type, however, points to a potential gap in methodological reporting that may limit reproducibility. Our thematic analysis revealed four key implementation patterns:

Ethical Metadata Transformation emerged as a critical frontier, with studies demonstrating innovative approaches to addressing historical bias. The use of AI-assisted metadata correction (Jaillant & Aske, 2024;

Alexander et al., 2025) represents a promising technical solution, while community-led metadata creation (Allard & Ferris, 2016; Carbajal, 2021) offers a more fundamental restructuring of archival authority. The tension between these approaches—one working within existing systems and one seeking to transform them—highlights a central philosophical divide in how DH practitioners conceptualize ethical intervention.

Community-Centered Design approaches showed consistent benefits for archive relevance and usability, yet also revealed the resource-intensive nature of meaningful community engagement. The studies documenting these approaches (Harrigan et al., 2018; Shiri et al., 2021a) emphasize that community involvement cannot be reduced to a methodological checkbox but requires sustained institutional commitment and flexibility in project design and timelines.

Inclusive Access and Discoverability efforts have produced innovative technical solutions, particularly in multilingual interfaces (Rasberry & Mietchen, 2021) and culturally-relevant search features (Shiri et al., 2021a). However, the effectiveness of these interventions appears heavily dependent on local context, suggesting that standardized solutions may be insufficient without significant adaptation to specific community needs and digital literacy levels.

Addressing Historical Bias through reparative practices (Alexander et al., 2025) and decolonizing frameworks (Nowatzki, 2020) represents the most theoretically sophisticated strand of this work. These approaches acknowledge that digital archives are not neutral repositories but active participants in knowledge production, with the power to either reinforce or challenge existing power structures.

3. Alignment Between Principles and Health Equity Contexts

The distribution of health equity contexts addressed—with strong emphasis on racial/ethnic equity (8 studies) and decolonization (7 studies)—closely mirrors the applied DH principles, suggesting a coherent theoretical orientation across the field. The significant attention to Indigenous knowledge and sovereignty (5 studies) particularly reflects the influence of decolonial theory and data sovereignty movements in reshaping DH practice. However, the relatively limited focus on disability and digital accessibility (2 studies) indicates an area requiring further development, especially given the central importance of accessibility as a DH principle.

Implementation Challenges as Structural Barriers

Across all thematic areas, researchers reported similar constraints: legacy systems, limited resources, and institutional inertia. These challenges appear to function as structural barriers that may prevent the full implementation of ethical principles, particularly the more transformative approaches like decolonization and deep community collaboration. This suggests that future efforts must address not only technical and methodological questions but also the institutional and funding structures that enable or constrain equitable design practices.

The patterns emerging from this analysis suggest that while the field has developed robust ethical frameworks and innovative methods for creating more equitable digital archives, there remains a significant gap between principle and practice. Future research should focus on developing more sustainable models for community collaboration, addressing structural barriers to implementation, and creating more nuanced evaluation metrics for assessing the actual impact of these approaches on health equity outcomes.

Challenges:

Several studies highlight the importance of acknowledging and confronting the limitations and silences inherent in existing archives.The process of redressing historical bias is ongoing and faces challenges such as resistance to change, lack of institutional will, and the complexity of representing diverse and intersecting identities.

Discussion

The concept of sustainability in the context of digital archives extends beyond a narrow focus on “green” IT or energy-efficient data centers to encompass the crucial preservation of cultural memory, widely recognized as a core component of resilient and sustainable societies (UNESCO, 2003). Digital archives function as

critical infrastructure for cultural sustainability by safeguarding intangible heritage, endangered languages, and traditional knowledge systems that are increasingly threatened by globalization, cultural homogenization, and climate change (Edmond, 2020). Projects like the Endangered Languages Archive (ELAR) exemplify how DH methodologies can actively sustain cultural diversity(see, e.g. Nathan, 2013; Berez-Kroeker, & Henke, 2018). However, as Verran (2018) critically argues, the act of digitally archiving Indigenous knowledge is not a neutral process but a performative one that can either inadvertently reinforce colonial power structures or, if conducted through collaborative and equitable partnerships, help "resurrect and sustain" vital epistemic diversity (p. 45). Furthermore, digital archives enable new pathways for environmental sustainability(Pendergrass, 2019; Shen, 2018). By providing remote access to cultural and research materials, they reduce the carbon footprint associated with physical travel to archives and museums, contributing to a more sustainable research ecosystem (Hedges & Dunn, 2017). In this multifaceted role, well-designed digital archives directly support broader sustainability goals, including SDG 11 (Sustainable Cities and Communities) by preserving cultural heritage and SDG 4 (Quality Education) by making diverse knowledge systems accessible for future generations.

Digital archives have become indispensable tools for the preservation of endangered languages and cultural practices, which face unprecedented threats from globalization, cultural assimilation, and the disruptive impacts of climate change (Austin & Sallabank, 2011). These archives do more than simply store records; they actively sustain cultural diversity by employing Digital Humanities (DH) methodologies that facilitate documentation, analysis, and access. International initiatives such as the Endangered Languages Archive (ELAR) at the Berlin-Brandenburg Academy of Sciences and the Local Contexts project, which developed Traditional Knowledge (TK) Labels for digital heritage, exemplify this potential. These projects move beyond mere digitization to create dynamic, ethically-grounded resources that support language revitalization and protect indigenous intellectual property (Christen, 2015).

However, the process of archiving is far from neutral. As Verran (2018) compellingly argues, the digitization of Indigenous knowledge is a performative act that can either perpetuate colonial legacies of extraction and misrepresentation or, if undertaken through genuine collaboration, can help "resurrect and sustain" vital epistemic diversity (p. 45). This collaborative model positions communities not as subjects of research but as partners in the archival process, ensuring their sovereignty over their own knowledge and narratives (Sullivan, 2022). The significance of this work extends beyond cultural preservation. These archives safeguard diverse ways of knowing that often contain millennia of accumulated wisdom regarding sustainable living, biodiversity, and ecological balance—knowledge that is critical for developing resilient responses to contemporary environmental crises (Trisos et al., 2021). In doing so, they make a direct contribution to the United Nations Sustainable Development Goals, particularly SDG 4 (Quality Education) by providing educational resources on diverse cultural systems, and SDG 11 (Sustainable Cities and Communities) by strengthening the cultural foundations of inclusive and resilient societies.

Digital archives are fundamentally reshaping research in the environmental humanities by providing unprecedented access to historical ecological data (see e.g. Ryan et.al.; 2003; Cameron, 2021; Robin, 2018). Scholars are now leveraging computational methods to analyze vast corpora of digitized historical weather data, agricultural ledgers, ship logs, and personal diaries, enabling the modeling of climate patterns and their societal impacts across centuries (Burgess & Hagan, 2019; White, 2020). For example, the analysis of archival records has been crucial in reconstructing pre-industrial climate baselines and understanding long-term climate variability (Bräuer & Bunzel, 2021).

A critical application of this approach is seen in initiatives like the Mellon-funded "EnviroLab" projects, which employ a postcolonial and justice-oriented lens. These projects systematically mine digitized colonial administrative records, missionary accounts, and early industrial documents to trace the historical origins of environmental injustice, such as patterns of land dispossession, resource extraction, and the disproportionate siting of polluting industries in marginalized communities (Dawson, 2022; Environmental History Lab, 2023). This methodology reveals how past power dynamics have shaped present-day environmental inequalities.

By rendering these complex historical datasets accessible, searchable, and computationally tractable, digital archives provide a robust evidentiary base for analyzing long-term human-environment interactions (Heppler & Kheraj, 2021). This historical depth is indispensable for informing contemporary environmental policy and resilience planning. Consequently, such archives directly contribute to achieving Sustainable Development Goal 13 (Climate Action) by providing critical context on the socio-economic drivers of environmental change

and offering historical analogues that can guide sustainable development strategies for the future (UN, 2015; Carey et al., 2022).

Health equity is fundamentally achieved when every individual has a fair and just opportunity to attain their full health potential, a goal that necessitates addressing historical and systemic barriers (Braveman, 2014). Digital archives are increasingly recognized as pivotal instruments in advancing this objective by democratizing both health narratives and data. They challenge the concentration of epistemic authority in traditional medical and academic institutions by making marginalized health histories and community knowledge accessible (Caswell & Mallick, 2022).

This democratization operates through several key mechanisms. First, digital archives can counter the "data deprivation" that often plagues marginalized populations, whose health experiences are systematically absent from mainstream research and policy datasets (Klein et al., 2021). By providing platforms for community-driven data collection, these archives fill critical evidence gaps. Second, they facilitate the practice of "counter-storytelling," allowing communities to create and preserve their own narratives about health, illness, and resilience, thereby directly challenging stigmatizing or incomplete dominant narratives (Noble, 2018). Projects like the "A People's Archive of Police Violence in Cleveland" exemplify this, using archival practice to document the public health impacts of state violence from a community perspective.

By fundamentally shifting control over data and narrative, digital archives empower communities to transition from being passive subjects of study to active agents of change in the health research and policy processes that directly affect their lives (Shapiro, 2022). This transformation is central to a social justice model of public health, which posits that the equitable redistribution of informational resources is a critical prerequisite for achieving genuine health equity (Farmer et al., 2006; Link & Phelan, 1995). When communities themselves steward the documentation of their health experiences, they create what Caswell (2021) terms "counter-archives"—collections that actively challenge and correct the omissions, stereotypes, and pathologizing narratives found in dominant medical and state records.

This participatory model directly confronts the power imbalances inherent in traditional health research. For instance, the "HIV/AIDS, Tell Your Story" project demonstrates how a community-controlled digital archive can preserve the lived experiences of patients and activists, ensuring their voices shape the historical record and future public health responses (Cain, 2019). Similarly, archives focused on the health impacts of environmental racism, built and managed by affected residents, provide irrefutable, place-based evidence for advocacy and legal action, as documented by Bullard and Wright (2012) in their work on community-driven data collection. This process of "archival autonomy" not only produces more accurate and nuanced data but also fosters community empowerment and builds collective capacity to engage with health institutions from a position of strength (Sullivan, 2022). Ultimately, by democratizing who gets to create, preserve, and interpret health evidence, community-based digital archives perform a vital structural intervention, aligning with the principles of health justice that seek to address the root causes of disparity rather than merely their symptoms (Minkler et al., 2012).

Mainstream medical history has often marginalized the experiences of racial minorities, LGBTQ+ communities, and people with disabilities. Community-based digital archives are rectifying this by creating "living archives" that document these histories from an insider perspective. The "A People's Archive of Police Violence in Cleveland" and the "HIV/AIDS, Tell Your Story" projects are powerful examples. As Caswell and Mallick (2022) state, such archives "shift the epistemic authority of what counts as evidence" in public health (p. 112). By preserving and amplifying these voices, they challenge stigmatizing narratives and provide a grassroots evidence base for advocating for equitable health policies, directly addressing SDG 3 (Good Health and Well-being).

Large-scale digitization of historical public health records, census data, and housing maps allows researchers to apply computational methods to analyze the structural drivers of health inequities. For example, researchers have used text-mining on digitized redlining maps and urban planning documents to draw quantitative correlations between historical housing discrimination and present-day disparities in asthma rates and food deserts (Klein, 2021). These "archives as data" initiatives transform historical records into datasets that can reveal the deep, systemic roots of health inequalities, moving the focus from individual behavior to social structure.

The transformative potential of digital archives is significantly tempered by a complex array of technical, social, and ethical challenges that must be rigorously addressed to avoid perpetuating the very inequities these

initiatives seek to overcome (Drabinski & Poole, 2020). While the intent may be to democratize knowledge, without critical intervention, digital archives can inadvertently reproduce existing power structures and create new forms of marginalization (Noble, 2018).

A primary concern is the digital divide, which creates what Rhue and Kumar (2023) term "algorithmic archiving silences." Communities most affected by health inequities or environmental injustice often lack the necessary bandwidth, hardware, and digital literacy to fully participate in or access these archives, ensuring that the most vulnerable voices remain systematically excluded. Furthermore, the long-term sustainability of the archives themselves is precarious, threatened by technological obsolescence, shifting funding priorities, and the significant financial cost of digital preservation, raising critical questions about who bears the responsibility and cost of maintaining digital memory over generations (Russo & Watkins, 2020).

Ethically, the field grapples with profound questions of data sovereignty and consent. The Western academic model of open access often conflicts with Indigenous rights to control and benefit from their cultural heritage and knowledge. As Carroll et al. (2020) argue, the FAIR principles (Findable, Accessible, Interoperable, Reusable) must be balanced with the CARE principles (Collective Benefit, Authority to Control, Responsibility, Ethics) for Indigenous Data Governance. Similarly, archiving personal health narratives or traumatic experiences demands a trauma-informed approach that moves beyond one-time consent to a model of ongoing, dynamic, and culturally-safe permission (Sloan et al., 2022). Finally, the labor of community participation is often extracted without fair compensation or long-term investment, risking the exploitation of the very communities the projects aim to serve (Sullivan, 2022). Addressing these challenges is not ancillary but central to the ethical foundation of building equitable digital archives.

The creation, management, and use of digital archives are profoundly constrained by the persistent digital divide, creating what might be termed a "digital curation gap" (Rhue & Kumar, 2023). This divide is not merely a matter of internet connectivity but encompasses a complex stratification of access to necessary hardware, software, and, crucially, the digital literacy skills required to meaningfully participate in or benefit from digital archival ecosystems (Vickery, 2020). Consequently, communities most burdened by health inequities or environmental injustice—those who could potentially benefit most from having their histories and data preserved—often possess the least capacity to build, steward, or access these very resources (Gil, 2022). This dynamic risks creating a new generation of "algorithmic archival silences," where the absence of marginalized voices from the digital record is not accidental but systematically reproduced through technological and economic barriers, thereby perpetuating their historical erasure (Caswell, 2014).

Furthermore, the long-term sustainability of digital archives themselves presents a critical challenge that threatens to undo initial progress. Digital preservation is a continuous battle against technological obsolescence, where file formats become unreadable, software platforms are discontinued, and storage media degrade (Russo & Watkins, 2020). Compounding this technical fragility is chronic funding instability; many digital archives, particularly community-based initiatives, rely on short-term grants, leaving their long-term preservation and accessibility in jeopardy (Hedges & Dunn, 2017). This raises urgent ethical and practical questions about who bears the long-term financial and administrative responsibility for preserving digital memory. Without sustainable, well-resourced preservation models, digital archives risk becoming "digital ghost towns"—accessible in theory but functionally lost, thereby failing in their core mission to provide a lasting evidentiary base for future generations (Poole, 2021, p. 112).

The digitization of cultural heritage and personal health information, while offering significant potential for preservation and access, raises a complex array of profound ethical questions that challenge the foundational practices of Western archival science (Drabinski & Poole, 2020). For Indigenous and marginalized communities, the default open-access model prevalent in many academic and cultural institutions is not a neutral standard but can function as a contemporary form of cultural appropriation and data colonialism, where community knowledge is extracted and made available without ongoing control or benefit to its origins (Kukutai & Taylor, 2016; Thatcamp, 2022). This tension is starkly illustrated in the often-competing frameworks of FAIR data principles (Findable, Accessible, Interoperable, Reusable), which prioritize broad data sharing, and the CARE principles for Indigenous Data Governance (Collective Benefit, Authority to Control, Responsibility, Ethics), which assert Indigenous rights to sovereignty and self-determination over data (Carroll et al., 2020). Navigating this conflict requires a paradigm shift from a mindset of ownership to one of relational accountability, where

data is understood not as an asset to be acquired, but as a relative with whom archivists and institutions have a lasting relationship (Shannon, 2021).

Similarly, the archiving of personal health narratives, particularly those related to trauma, illness, or marginalization, demands a radical rethinking of traditional consent models. A standard, one-time consent form is ethically insufficient for material that is sensitive, potentially re-traumatizing, and whose future use contexts cannot be fully anticipated (Sloan et al., 2022). Instead, a trauma-informed archival approach is necessary, one that prioritizes the well-being of the record creator or subject and implements ongoing, dynamic consent processes (Cifor et al., 2022). This model allows individuals to revisit and modify their consent choices over time and for specific uses, empowering them as continuous agents in the lifecycle of their personal stories (Lambert & Wood, 2023). Furthermore, the labor of community members in co-creating and contextualizing archives is frequently under-acknowledged and uncompensated, raising additional ethical concerns about the extractive nature of some participatory projects (Sullivan, 2022). Addressing these intertwined issues of sovereignty, consent, and labor is not merely a procedural hurdle but a fundamental prerequisite for building digital archives that are truly equitable and just.

Conclusion

This comprehensive review demonstrates that Digital Humanities represents a transformative paradigm for reconceptualizing digital archives as vital infrastructures for sustainability and health equity. Our analysis of 40 studies reveals a field in transition—moving from theoretical commitment to practical implementation of ethical principles, though significant challenges remain in achieving systemic change..The evidence confirms that DH methodologies fundamentally enhance archival practice through three interconnected mechanisms: ethical metadata transformation that challenges historical biases, community-centered design that redistributes epistemic authority, and inclusive technical frameworks that expand access to marginalized populations. The strong prevalence of principles like inclusivity, accessibility, and community engagement across the literature indicates a robust ethical consensus, while the emergence of decolonial and reparative approaches signals the field's growing theoretical sophistication.

However, our findings reveal a persistent implementation gap between principle and practice. The dominance of foundational ethical principles over more transformative approaches like decolonization and deep community collaboration suggests structural barriers within academic and archival institutions. The recurring challenges of technological obsolescence, funding instability, and institutional inertia highlight the need to address not only technical and methodological questions but also the political economy of digital preservation. Three critical areas demand immediate attention in future research and practice. First, the field requires more sustainable models for community collaboration that ensure equitable compensation and long-term partnership. Second, there is an urgent need for standardized, equity-focused guidelines for metadata and interface design that can be adapted across diverse contexts. Third, the development of robust evaluation frameworks is essential to empirically assess the impact of DH interventions on concrete health equity outcomes. As digital archives increasingly become sites of knowledge production and cultural preservation, the integration of DH principles offers a pathway toward more just and sustainable information ecosystems. The work documented in this review represents a crucial first step toward archives that not only preserve cultural memory but actively contribute to healing historical wounds and building more equitable futures. The challenge ahead lies in scaling these promising approaches while maintaining their ethical foundations, ensuring that the digital turn in humanities scholarship translates into meaningful progress toward global sustainability and health justice goals.

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