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Article

Critical foundations for a digital health observatory in the Amazon

Fundamentos críticos para um observatório em saúde digital na Amazônia

Fundamentos críticos para un observatorio de salud digital en la Amazonía

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Abstract

Objective: To propose theoretical-conceptual and operational foundations for establishing a Digital Health Observatory guided by popular sovereignty, with an emphasis on the Amazon region of Pará. **Methodology:** A qualitative study of a theoretical-analytical and exploratory nature, based on a narrative literature review and document analysis of digital health regulatory frameworks in Brazil, linked to the concepts of meta-presence, digital coloniality, and popular digital sovereignty. **Results:** The review selected five articles considered central to the research's theoretical-conceptual underpinning and which met the established inclusion criteria. Results: Advances were identified in

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the institutionalization of digital health within the Unified Health System, particularly regarding telehealth regulation and the consolidation of the National Health Data Network. However, gaps persist regarding the incorporation of territorial, subjective, and democratic dimensions of care, alongside the fragility of social participation mechanisms in digital governance. Secondary evidence indicates significant inequalities in technological infrastructure and digital access in regions such as the Amazon, reinforcing historical asymmetries. **Conclusion:** A Digital Health Observatory model is proposed, structured around three axes: I) Techno-political monitoring; II) Meaning-making; and III) Social participation. This Observatory aims to act as a critical mechanism for data production and analysis, as well as for advocacy and the territorialization of the Unified Health System's digital transformation.
Keywords: Health observatories; Digital health; Amazon.

Resumo

Objetivo: propor fundamentos teórico-conceituais e operacionais para a constituição de um Observatório de Saúde Digital orientado pela soberania popular, com ênfase na Amazônia Paraense. **Metodologia:** estudo qualitativo, de natureza teórico-analítica e exploratória, baseado em revisão narrativa da literatura e análise documental de marcos normativos da saúde digital no Brasil, articulados aos conceitos de metapresencialidade, colonialidade digital e soberania digital popular. **Resultados:** a atual revisão selecionou cinco artigos considerados centrais para a sustentação teórico-conceitual da pesquisa e que também atenderam os critérios de inclusão estabelecidos. **Resultados:** identificam-se avanços na institucionalização da saúde digital no Sistema Único de Saúde, especialmente na regulação da telessaúde e na consolidação da Rede Nacional de Dados em Saúde. Contudo, persistem lacunas relacionadas à incorporação das dimensões territoriais, subjetivas e democráticas do cuidado, além da fragilidade de mecanismos de participação social na governança digital. Evidências secundárias indicam desigualdades significativas na infraestrutura tecnológica e no acesso digital em regiões como a Amazônia, reforçando assimetrias históricas. **Conclusão:** propõe-se um modelo de Observatório de Saúde Digital, estruturado em três eixos: I) Monitoramento tecnopolítico; II) Produção de sentidos e III) Participação social. Este observatório visa funcionar como dispositivo crítico de produção e análise de dados; de incidência e territorialização da transformação digital do Sistema Único de Saúde.
Palavras-chave: Observatórios de Saúde; Saúde digital; Amazônia.

Resumen

Objetivo: Proponer fundamentos teórico-conceptuales y operacionales para el establecimiento de un Observatorio de Salud Digital guiado por la soberanía popular, con énfasis en la región amazónica de Pará. **Metodología:** Un estudio cualitativo, teórico-analítico y exploratorio, basado en una revisión narrativa de la literatura y análisis documental de marcos normativos para la salud digital en Brasil, articulado con los conceptos de metapresencia, colonialidad digital y soberanía digital popular. **Resultados:** La presente revisión seleccionó cinco artículos considerados fundamentales para el fundamento teórico y conceptual de la investigación y que, además, cumplían con los criterios de inclusión establecidos. Se identifican avances en la institucionalización de la salud digital dentro del Sistema Único de Salud brasileño, especialmente en la regulación de la telesalud y la consolidación de la Red Nacional de Datos de Salud. Sin embargo, persisten brechas con respecto a la incorporación de las dimensiones territorial, subjetiva y democrática de la atención, así como la fragilidad de los mecanismos para la participación social en la gobernanza digital. La evidencia secundaria indica desigualdades significativas en infraestructura tecnológica y acceso digital en regiones como la Amazonía, reforzando asimetrías históricas. **Conclusión:** Se propone un modelo para un Observatorio de Salud Digital estructurado en torno a tres ejes: I) Monitoreo tecnopolítico; II) Producción de significados; y III) Participación social. Este Observatorio busca funcionar como

un instrumento crítico para la producción y el análisis de datos, así como para la incidencia y la territorialización de la transformación digital del Sistema Único de Salud.
Palabras clave: Observatorios de salud; Salud digital; Amazonas.

Introduction

A Digital transformation in the field of health has established itself as one of the cornerstones of contemporary public policy, particularly following the institutionalization of Brazil's Digital Health Strategy for the period 2020–2028[1]. This process involves the intensive incorporation of digital information and communication technologies into the care, management, surveillance, and governance services of the Unified Health System (SUS), redefining professional practices, work processes, and modes of access to care, as well as the relationships between users, workers, and the State. However, the expansion of digital health cannot be understood merely as technical modernization or instrumental innovation, as it is a profoundly political phenomenon, shaped by power struggles, economic interests, knowledge regimes, and territorial inequalities.

In the Brazilian context, these disputes take on even more complex dimensions when viewed from regions historically marked by processes of structural marginalization and gaps in healthcare provision, such as the Amazon region of Pará. The region's unique geographical, sociocultural, and infrastructural characteristics challenge universal models of healthcare digitization, which are often formulated based on urban, centralized, and technocratic frameworks. Although digital health is often presented as a solution to access barriers in vast territories where travel is difficult, the literature indicates that, without adequate political and social mediation, such technologies can exacerbate existing digital inequalities, reproducing disparities in access to the internet, devices, and technological skills[2,3].

In this context, there is a need for critical mechanisms capable of monitoring, analyzing, and intervening in the direction of digital health policy[4]. It is at this point that the concept of an observatory emerges as a relevant strategy. More than merely technical mechanisms for monitoring indicators, observatories can function as spaces for the collective production of knowledge, citizen oversight, and the negotiation of meanings regarding technology, health, and democracy. When guided by the principles of public health, continuing education, and popular sovereignty, these mechanisms have the potential to integrate technical knowledge, local and territorial experiences, and social participation, contributing to a digital transformation of the SUS that is ethical, equitable, and socially grounded.

The discussion on popular sovereignty in the field of digital policy offers fundamental insights into this issue. Unlike approaches focused exclusively on the state or national security, popular digital sovereignty emphasizes collective and community control over technologies, data, and digital infrastructure, linking the technological issue to emancipatory political projects[5]. This perspective engages directly with the field of public health, which has historically advocated for social participation, democratic control, and the territorialization of health policies as foundational principles of the SUS.

In light of these issues, this study aims to propose a conceptual-operational model for a Digital Health Observatory, guided by popular digital sovereignty and rooted in the Amazon region of Pará, integrating frameworks from public health and critical studies of technology. In addition to its conceptual framework, the proposal for a Digital Health Observatory presented here is grounded in

intitutional conditions of possibility, drawing on the activities of the Programa de Educação pelo Trabalho para a Saúde – Informação e Saúde Digital (PET-Saúde/I&SD), developed at the Universidade Federal do Pará (UFPA). The group is composed of faculty members, undergraduate and graduate students, as well as professionals affiliated with the Unified Health System (SUS), forming an interdisciplinary team.

From an operational standpoint, it is proposed that the observatory function as an academic-institutional mechanism, systematically producing analyses, technical reports, training activities, and forums for dialogue with managers and for social oversight. Previous initiatives, such as the Amazon Health Observatory, were developed with a focus on decision support for managers, highlighting the absence of initiatives aimed at the critical analysis of digital health in the Amazon region[6]. However, a specific gap has been identified regarding observatories oriented toward the critical analysis of digital health particularly from a public health perspective given the lack of established local bodies dedicated to critical analysis, sociopolitical monitoring, and social participation in digital governance.

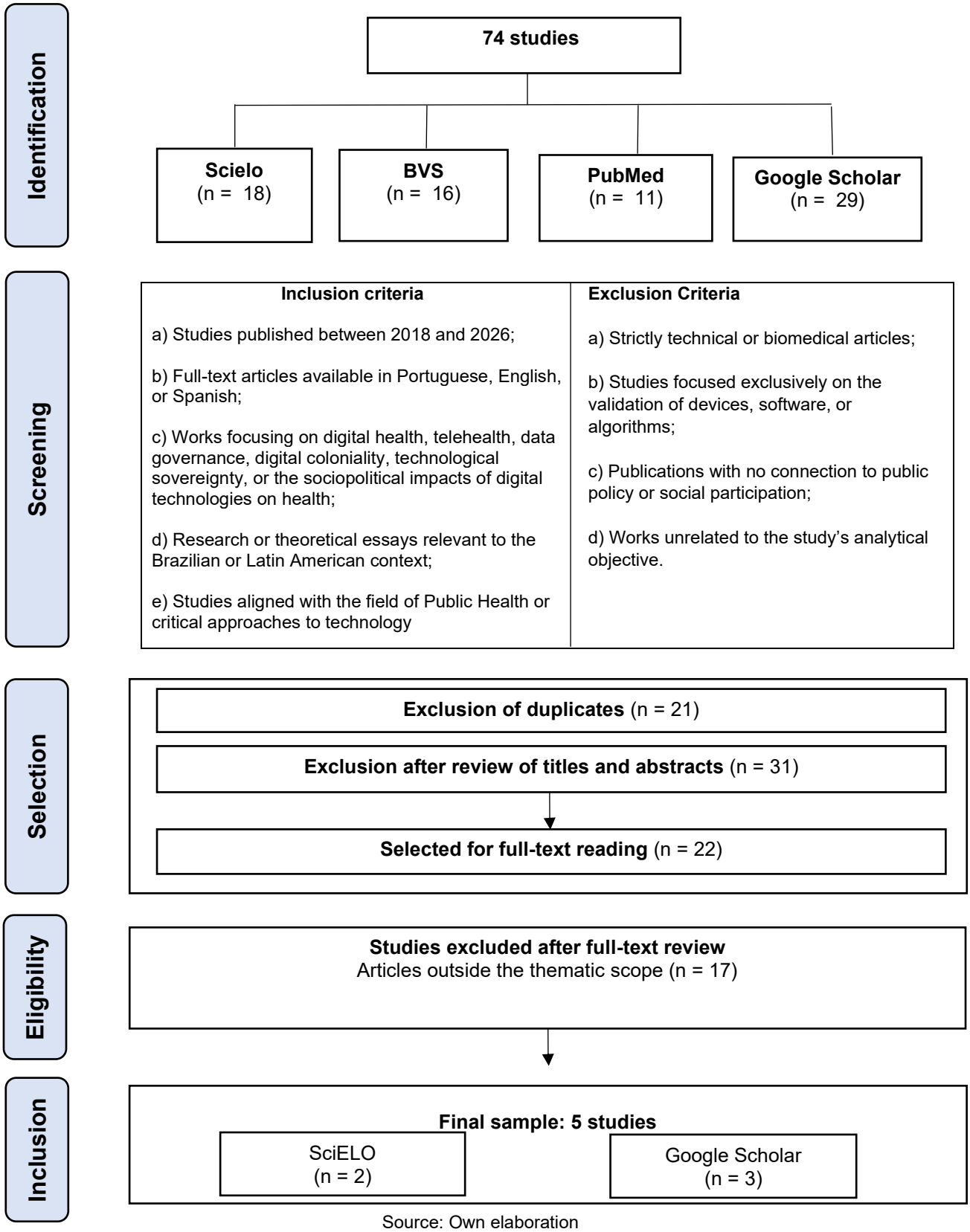
Methodology

This is a qualitative study of a theoretical-analytical and exploratory nature, based on a narrative literature review and documentary analysis. A narrative review was chosen due to the exploratory, theoretical-analytical, and propositional nature of the study. Unlike systematic reviews, the objective was not to comprehensively synthesize evidence on the effectiveness of digital health interventions, but rather to identify conceptual frameworks and analytical contributions capable of supporting the construction of a conceptual-operational model for a Digital Health Observatory guided by popular sovereignty and rooted in the Amazon region of Pará. The literature search was conducted between December 2025 and January 2026 in the Scientific Electronic Library Online (SciELO), PubMed, Google Scholar, and the Biblioteca Virtual em Saúde (BVS) databases, using the following search terms: “digital health,” “telehealth,” “SUS,” “digital sovereignty,” and “digital coloniality,” combined using Boolean operators. The time frame considered was from 2018 to 2026. The time frame began in 2018 because it corresponds to the period of intensified contemporary debates on digital health in Brazil and internationally, including the enactment of the General Personal Data Protection Law (LGPD) and the intensification of discussions on digital governance, interoperability, and the digital transformation of health systems, which later culminated in the Digital Health Strategy for Brazil 2020–2028. Studies focusing on public policy, digital health, and health technology relevant to the Brazilian or Latin American contexto were included, resulting in 74 documents.

Studies that were exclusively technical or lacked critical analysis, as well as duplicates, were excluded, leaving 22 studies that were reviewed in full. After applying the eligibility criteria, 17 articles were excluded because they had a predominantly operational focus, lacked a connection to the Brazilian or Latin American context, did not sufficiently align with public health frameworks, or showed low adherence to the study’s objective. In the end, the analytical corpus consisted of five articles considered central to the theoretical and conceptual foundation of the research: Malta and Lamy[2], Almeida-Filho[7], Grohmann, Burity, and Vilarins[8], Tello[9], Evangelista[10], in addition to the studies by Faustino and Lippold[11] and Nemorin and Bonami[12], selected for their converfence

with the analytical axes of digital sovereignty, technological coloniality, and the reconfiguration of digitally mediated care practices (Figure 1).

Figure 1. Flowchart of the search process using the databases and descriptors



Source: Own elaboration

Although 22 studies were deemed eligible after a full-text review, we chose to conduct a more in-depth analysis of those considered central to the construction of the study's analytical categories. This approach is consistent with narrative reviews of a theoretical-interpretive nature, in which analytical centrality, conceptual density, and adherence to the research problem are prioritized over quantitative exhaustiveness. The remaining studies contributed to contextualizing the field under investigation and to interpreting the results, even though they did not play a central role in structuring the proposed conceptual model.

A literature review was also included, covering legislation and regulations from the Ministry of Health, including the Digital Health Strategy[13], the National Health Data Network[14] and the SUS Digital Program[15]. The interpretation was guided by three analytical categories: metapresence[7], digital coloniality[11] and popular sovereignty[8]. The study is part of the activities of PET-Saúde/I&SD (UFPA), within the Working Group on the Digital Health Observatory, lending a situated character to the analysis. Since it does not involve human subjects, it does not require approval by an Ethics Committee.

Results and Discussion

Digital health, as an emerging field of practices, knowledge, and public policies, is not limited to the simple adoption of digital technologies in health care. As demonstrated by the narrative review on the topic, it is a comprehensive concept that encompasses telemedicine, telehealth, e-Health, mobile health, and other socio-technical arrangements mediated by information and communication technologies, linked to the organization of health systems and state strategies for health governance[13]. In the Brazilian context, the development of digital health occurs in an intersectoral manner, involving multiple ministries, regulatory bodies, and normative frameworks, highlighting its structural importance to the contemporary functioning of the SUS.

From a historical-normative perspective, the institutionalization of digital health in Brazil is rooted in a long history of public policies that predate the very consolidation of the term. The Federal Constitution of 1988, by establishing the SUS and affirming health as a universal right and a duty of the State, laid the legal foundation that would later enable the incorporation of digital technologies as tools for expanding access, comprehensiveness, and equity[16]. Beginning in the 1990s, with the National Policy on Health Information and Informatics and, more recently, with the Digital Health Strategy for Brazil 2020–2028, there has been a trend toward the increasing formalization and centrality of digital technologies in the organization of the health system.

The Digital Health Strategy for Brazil outlines a vision for the future in which digitization is conceived as a cross-cutting pillar capable of integrating information, innovation, and health services on a national scale. The creation of the National Health Data Network (RNDS) and the "Conecte SUS" platform exemplifies this project by proposing an interoperable digital infrastructure aimed at the circulation of clinical, administrative, and epidemiological data among different levels of care and management[16]. However, the literature indicates that such initiatives, while fundamental to the modernization of the SUS, entail ethical, political, and social challenges related to data protection, digital surveillance, and the concentration of informational power.

Data from the ICT in Health survey[17] show that, although the Northern Region has high connectivity coverage with approximately 96% of healthcare facilities connected via fiber optics significant inequalities persist in the quality and use of digital technologies. Approximately 44% of

facilities have a connection speed exceeding 100 Mbps, while a significant portion still operates at lower speeds, limiting the adoption of more complex solutions. Regarding the use of advanced technologies, only 47% of facilities use structured data for analysis, and less than 30% incorporate geolocation data. Among healthcare professionals, 63% of physicians use digital tools, primarily for communication, with lower adoption of integrated clinical systems. These data indicate that digital transformation in the region is occurring unevenly and is still in its early stages, especially with regard to the incorporation of analytical technologies and systems integration, reinforcing the need for critical mechanisms for monitoring and conducting territorialized analysis of digital health policies.

These tensions become particularly evident when analyzing digital health through the lens of social and territorial inequalities. As noted by Zampirolli *et al*.[3] and also by Costa and Marin[4], despite the widespread use of mobile devices in Brazil, profound disparities persist in access to high-quality internet, the availability of equipment, and the population's digital skills, especially in peripheral and rural regions. Thus, the promise of expanding access to care through digitization may, paradoxically, become a new vector of exclusion if it is not accompanied by public policies that are sensitive to the concrete conditions of these territories.

In the field of public health, such dilemmas have been addressed from a critical perspective that rejects both uncritical technophilia and technophobia. The studies by Moraes and Fornazin[18] argue for the need to understand digital health as a complex sociotechnical process, in which technologies are produced, appropriated, and reinterpreted within specific historical contexts, shaped by power relations and disputes over meaning. This approach emphasizes that the effectiveness of digital health technologies depends not only on their technical sophistication but also on how they are integrated into care practices, interpersonal relationships, and the participatory principles of the SUS.

The COVID-19 pandemic has intensified these discussions by accelerating the adoption of telemedicine, remote monitoring systems, and digital care management platforms. Although these strategies have played a significant role in mitigating health risks, they have also highlighted structural weaknesses in the system, such as insufficient digital infrastructure in certain regions and the precarious nature of platform-mediated healthcare work[16]. These factors underscore the need for analytical tools capable of critically monitoring the implementation of digital health, assessing not only its operational outcomes but also its social, political, and subjective impacts such as on care experiences, therapeutic bonds, and relationships between users and professionals.

In this sense, digital health should be understood as a field of contention, in which different visions of society clash[5]. On one side are models guided by managerial rationality, market logic, and the technocratic centralization of data; on the other, perspectives aligned with the principles of public health, which advocate for social participation, the territorialization of policies, and the defense of the public nature of the SUS[8,9]. From the perspective of public health, authors such as Almeida-Filho[7] highlight "metapresence" as an analytical key to understanding new forms of digitally mediated care that integrate physical and virtual dimensions. Meanwhile, the critique of digital coloniality, developed by Faustino and Lippold[11], highlights how technological infrastructures can reproduce asymmetrical power relations, especially in peripheral territories. In the field of digital policy, Grohmann *et al*.[8] propose the notion of popular digital sovereignty, emphasizing collective control over technologies and data. These approaches converge in

highlighting that the digital transformation of health involves not only technical efficiency but also disputes over autonomy, participation, and social justice.

Metapresence, Territory, and Care: Contributions of Public Health to Digital Health

The incorporation of digital technologies into the field of health necessitates a reexamination of the classical categories that structure health-related thinking, including the notions of presence, territory, and therapeutic encounter[2]. Traditionally, health care has been conceived based on the physical co-presence of professionals and users, anchored in defined institutional spaces, such as primary care units, outpatient clinics, and hospitals[5]. However, the expansion of digital health challenges this logic by introducing mediated forms of interaction that do not fit into simple dichotomies between in-person and virtual. In this context, the concept of metapresence emerges as a relevant theoretical contribution to understanding contemporary rearrangements in health care[7].

Metapresence refers to a sociotechnical arrangement in which multiple forms of presence (material, digital, synchronous, asynchronous, local, and remote) are integrated in a coordinated manner, enhancing the healthcare encounter rather than replacing it. Unlike conceptions that reduce technology-mediated care to an impoverished or dehumanized experience, this approach recognizes that presence is always produced relationally, involving symbolic, affective, and communicational dimensions. Thus, digital health, when guided by public health principles, can expand the possibilities for connection, active listening, and continuity of care, provided it is critically integrated into local practices and contexts[7].

Within the context of Brazilian public health, this discussion takes on central importance as it engages with critiques of biomedical and hospital-centered models that have historically prioritized isolated and fragmented interventions. The metapresential perspective proposes a reorganization of health systems toward ecosystemic, networked, and matrix-based models, in which care is distributed across complex networks that transcend rigid institutional boundaries[4]. Such a reconfiguration is particularly relevant in vast and heterogeneous territories, where the logic of referral and counter-referral based exclusively on physical presence proves insufficient to guarantee access and comprehensive care[4].

In the Amazon region of Pará, these issues are acutely felt. The vast territorial expanse, the diversity of riverine, Indigenous, and Quilombola populations, as well as transportation and infrastructure challenges, pose a challenge to conventional models of healthcare organization[8]. In this context, digital health mediated by metapresential arrangements can play strategic role by articulating local knowledge, community practices, and technological mediations, without disregarding the materiality of territories and social relations. However, this potential can only be realized if technologies are adopted in a context-specific manner, respecting local ways of life and sociocultural dynamics, especially in contexts such as northern Brazil.

When implemented out of context, digital technologies tend to reinforce processes of deterritorialization of care, imposing logics external to territories and weakening the autonomy of individuals and communities[8]. For this reason, “metapresence” must be understood not only as a technical innovation but as a political-organizational principle that guides the integration of technology, territory, and social participation[7]. This perspective aligns with the ethical and political values of public health, affirming that health care is inseparable from living conditions, power relations, and forms of social organization.

By recognizing digital health as a field of contention, metapresence helps shift the focus from technology itself to the processes of mediation it engenders. This implies considering who defines technological designs, what interests guide their implementation, and how territorial actors do or do not participate in these decisions. While on the one hand the challenge of digital literacy within the SUS persists, on the other hand, territorial health literacy remains a priority[19]. In this sense, metapresence offers a fertile conceptual framework for developing critical mechanisms to monitor digital health policies, capable of analyzing both the material and symbolic effects of the digitization of care.

It is from this intersection between digital health, metapresence, and territory that the need for entities such as observatories understood as spaces for critical analysis and the production of knowledge about ongoing processes is reinforced. Such mechanisms can act as mediators between national policies and local realities, contributing to the construction of a digital transformation of the SUS that not only expands access but also strengthens bonds, recognizes diversities, and promotes socioterritorial justice.

Popular sovereignty, autonomy, and digital policy: foundations for a critical observatory

The notion of sovereignty, historically associated with the authority of the nation-state, has been profoundly reconfigured in the context of digital technologies[4]. The emergence of global platforms, private data infrastructures, and transnational algorithmic regimes shifts the axis of political power, straining traditional forms of democratic governance. In this scenario, the debate over digital sovereignty takes center stage, though not without conceptual ambiguities and normative disputes. As Grohmann *et al.*[8] argue, digital sovereignty is not a univocal concept; rather, it is appropriated by different political projects ranging from state-nationalist approaches to perspectives rooted in community practices and social movements.

The proposal for popular digital sovereignty emerges precisely as a critique of formulations centered exclusively on the state or national security. Inspired by Latin American traditions of popular sovereignty, this approach shifts the focus of sovereignty to the collective capacity to decide, produce, and control technologies in a situated manner and oriented toward emancipatory ends. It involves understanding technology not as a neutral tool, but as a field of political contestation, intersected by economic interests, persistent colonialities, and global power asymmetries[2,8].

In the field of digital policies, popular sovereignty engages with the notion of autonomy, though it is not to be confused with it. While sovereignty refers to the ultimate source of political authority, autonomy emphasizes concrete practices of self-governance, prefiguration, and the construction of alternatives in everyday life. According to Nemorin and Bonami, Marxist-autonomist, feminist, and decolonial traditions have emphasized autonomy as a way of doing politics "from below", often in a critical or ambivalent relationship with the state[12]. However, as Grohmann *et al.*[8] point out, popular sovereignty and autonomy can be conceived of as complementary, especially when seeking to articulate social participation, democratic control, and structural public policies.

These reflections are particularly relevant to the field of digital health. The digitization of the SUS involves not only the adoption of technologies but also a profound reorganization of the ways in which health care is governed, data is produced, and health priorities are set. The growing centrality of databases, interoperability systems, and digital platforms raises questions about who controls these

infrastructures, who benefits from their use, and what rationales guide their application. Critical authors such as Moraes and Fornazin[18] and Faustino and Lippold[11] have warned of the risk of a "platformization of health care," in which market logic, surveillance, and managerial efficiency override the principles of universality, comprehensiveness, and social participation.

In the Amazonian context, these tensions may intensify. Historically, the Amazon has occupied a peripheral position in the circuits of knowledge production and political decision-making, often being treated as a space for technological experimentation or data extraction, without proportional benefits for local populations[20]. The digitization of healthcare, if carried out without critical scrutiny, risks reproducing this colonial logic, transforming territories and bodies into mere sources of data for centralized systems. In this sense, popular digital sovereignty[8] offers an ethical-political framework for rethinking digital transformation from the perspective of local territories, valuing local knowledge, community-based forms of organization, and participatory decision-making processes. The establishment of a Digital Health Observatory guided by popular sovereignty thus fits within this critical framework. Unlike technocratic observatories focused exclusively on the production of indicators, this initiative is conceived as a space for the integration of technical analysis, political interpretation, and social participation. Inspired by the experiences of social and health observatories in Latin America[6], the observatory proposed here is based on the principle of knowledge co-production, recognizing users, health workers, researchers, and social movements as active agents in the interpretation of digital policies.

The Pará Amazon, Digital Health, and the Coloniality of Data

The Amazon region of Pará is a territory marked by profound historical contradictions. While it is home to vast biodiversity and sociocultural diversity, the region faces structural inequalities in access to public policies, infrastructure, and social rights. In the field of health, these inequalities manifest as difficulties in accessing services, inadequate equipment, and a shortage of professionals, especially in riverside and rural areas[20]. In this context, digital health is often presented as a technical solution to overcome geographical and logistical barriers. However, this narrative requires critical scrutiny[1].

In their studies on the coloniality of power and knowledge, Fautino and Lippold[11] warn that digitization processes can function as new forms of colonization by imposing epistemologies, technologies, and management models produced in hegemonic centers. In the case of health care, this can manifest in the standardization of protocols, the centralization of information systems, and the erasure of local care practices. According to Faustino and Lippold[11], the notion of data coloniality has been used to describe this phenomenon, highlighting how data produced in peripheral territories are frequently appropriated by external institutions, without any effective return to the communities that generate them.

In the Amazon region of Pará, the massive production of health data (epidemiological, clinical, and territorial) can either strengthen public policies or exacerbate inequalities, depending on the governance arrangements adopted[20]. The absence of local bodies to critically monitor these policies makes it difficult to identify negative impacts, such as the digital divide, excessive surveillance, or the cultural inappropriateness of technologies.

By linking digital health, popular sovereignty, and territory, the Observatory serves as a space of resistance to the extractivist logic of data. Its work can contribute to the reterritorialization of

digital health policy, strengthening processes of collective autonomy and expanding local capacity to influence technological decisions. The aim is to shift the debate from mere technical efficiency to the fundamental question: whom does the digital transformation of health serve? The analyses developed throughout this article demonstrate that digital health, far from being a neutral or merely technical field, is an arena of political, epistemological, and territorial disputes[8,18]. The growing incorporation of digital technologies into the SUS is reshaping care practices, management models, and forms of governance, while simultaneously introducing new regimes of visibility, control, and data production[4]. In this sense, the digital transformation of healthcare must be understood as a socially situated process, intersected by power relations and competing visions of society.

In the Amazonian context, such disputes take on specific contours, given the region's historical marginalization in national decision-making processes[20]. The Amazon region of Pará, often treated as an administrative periphery or as a testing ground for externally formulated policies, faces the risk of seeing the digitization of healthcare operate as a new layer of coloniality, thereby reinforcing asymmetries in the production and use of health data. The absence of local mechanisms for critical analysis and political advocacy regarding these transformations tends to widen the gap between national digital health policies and the concrete realities on the ground.

The intersection between digital health and public health particularly through the concept of "metapresentiality" offers pathways to address these challenges. By shifting the focus from technology to the relationships it mediates, metapresentiality allows us to conceive of the digitization of care in a way that is integrated with local conditions, social ties, and community practices. However, this potential depends on policy choices that value social participation, collective autonomy, and sociocultural diversity, avoiding the imposition of homogeneous and decontextualized models[21].

It is at this point that the notion of popular digital sovereignty proves particularly fruitful. By emphasizing collective control over digital technologies and infrastructure, this perspective places democracy back at the center of the debate on digital policy. In the field of health, this implies questioning who defines information systems, how data is used, and in the service of whose interests digital transformation is oriented. Popular sovereignty, understood as the collective capacity for decision and self-governance, offers a normative framework for conceiving digital policies that not only expand access but also strengthen rights and promote socioterritorial justice[8].

The Digital Health Observatory proposed in this article thus emerges as a strategic mechanism for mediation between public policies, territories, and individuals. By operating simultaneously on the technical, political, and symbolic levels, the observatory can help bring to light the conflicts and contradictions of the digitization of health, thereby expanding the capacity for social advocacy regarding this process. Rather than merely monitoring indicators, the goal is to produce critical interpretations and foster democratic processes of deliberation on the future of digital health within the SUS.

Regulatory Frameworks for Digital Health in Brazil and Their Tensions with Metapresence, Digital Coloniality, and Popular Sovereignty

The institutionalization of digital health in Brazil has been consolidated through a coordinated set of legal, infra-legal, and administrative mechanisms that seek to provide legal certainty, technical

standardization, and scalability to practices mediated by digital technologies within the Unified Health System (SUS), as shown in Table 1.

Table 1. Regulatory and Programmatic Evolution of Digital Health in Brazil

Year	Framework / Instrument	Description
2022	Law No. 14,510/2022 – Telehealth[22]	Authorizes and regulates the practice of telehealth in Brazil, amending Law No. 8,080/1990, and recognizing telehealth as part of health care.
2024	GM/MS Ordinance No. 3,232/2024 – SUS Digital Program[15]	Establishes the SUS Digital Program, with guidelines for promoting digital transformation in the SUS.
2024	GM/MS Ordinance No. 3,233/2024[23]	Regulates the planning phase of the SUS Digital Program to enable states and municipalities to develop action plans for digital health.
2024	GM/MS Ordinance No. 3,691/2024 – SUS Digital Strategic Action – Telehealth[13]	Establishes the Strategic Telehealth Initiative within the framework of the SUS Digital program, reinforcing the role of telehealth in the national digital health policy.
2024	GM/MS Ordinance No. 3,534/2024[24]	Approves the participation of state governments in receiving financial incentives for the planning phase of the SUS Digital program.
2025	Decree No. 12,560/2025 – RNDS and SUS Digital Platform[14]	Regulates the National Health Data Network (RNDS) and the SUS Digital platforms, providing guidance on interoperability, data governance, and the protection of rights.
2025	GM/MS Ordinance No. 7,495/2025 – SUS Digital Component of the "Agora Tem Especialistas" Program[25]	Establishes the digital health component to integrate systems, monitor specialized care, utilize RNDS data, and expand digital services for patient care.

Source: Research data, own elaboration.

Among these measures, Law No. 14,510/2022[22] stands out, amending the Organic Health Law (Law No. 8,080/1990) to permanently authorize and regulate the practice of telehealth throughout the national territory. By recognizing telehealth as a legitimate form of health care, the legislation represents a significant step forward from the exceptional and emergency nature that characterized its adoption during the COVID-19 pandemic, while also reinforcing principles such as informed consent, confidentiality, and professional responsibility[22]. In addition, the new PAC Saúde (Health Action Plan) provides billions in funding to expand healthcare services for the population through the SUS (Unified Health System); among the various improvements, there is a focus on telehealth services, providing telehealth multimedia kits to primary health care units (UBS)[27].

From a regulatory standpoint, Law No. 14,510/2022[22] helps expand access to health services, especially in vast territories with a low density of healthcare professionals, such as the Amazon region of Pará. However, by focusing predominantly on the functional aspects of the practice that is, on what can or cannot be done through digital means the legislation remains anchored in an instrumental conception of technology. Within this legal framework, there is no explicit examination

of the subjective experience of digitally mediated care, nor of how the subject's presence is reconfigured in platform-mediated healthcare encounters. In this sense, the concept of "metapresence," as developed in the field of public health, finds no direct normative translation, remaining instead a critical theoretical contribution that challenges the limits of legislation that still treats the digital realm as a medium rather than as a relational space for the production of presence, connection, and meaning[7].

The consolidation of the SUS's digital infrastructure is given a regulatory framework by Decree No. 12,560/2025[14], which regulates the National Health Data Network (RNDS) and the SUS Digital Platform. This decree establishes principles, objectives, and criteria for the interoperability of clinical, administrative, and epidemiological data, as well as guidelines for information security, personal data protection, and privacy impact assessments, in accordance with the General Personal Data Protection Law (LGPD) and its implementing regulations[14,26]. Ministry of Health (GM/MS) Ordinance No.7,495, dated August 4, 2025[25], also complements this decree by advancing the digital transformation of the "Agora Tem Especialistas" program, enabling direct communication with citizens (SMS, email, and WhatsApp), with the RNDS serving as the official data source. This represents a significant step forward in legally structuring the flow of data within the SUS, recognizing such data as strategic assets for healthcare delivery, health surveillance, management, and the formulation of public policies.

However, when analyzed in light of the concept of digital coloniality, these same advances in the decree reveal significant limitations. Although it establishes technical and legal safeguards for data processing, the regulatory framework still does not explicitly address the power asymmetries that permeate contemporary digital infrastructures, especially those related to technological dependence, the concentration of computational capabilities, and the location of the systems and servers that support the RNDS. The absence of regulatory provisions that seek to forcefully assert the technological and informational sovereignty of the Brazilian state and, even more so, of territorial communities leaves room for logics of data extraction and centralization to reproduce, in a digital context, historical dynamics of coloniality, in which peripheral territories become sources of data without effective control over their uses and destinations[11].

This tension intensifies when considering the Amazon region of Pará, a region historically marked by the exploitation of natural resources and local knowledge without proportional benefits for the populations that produce them. The current regulatory framework, by failing to provide for mechanisms of territorialized governance of health data or specific instances of social control over the RNDS, reveals a regulatory deficit in the face of demands for decentralization and even decolonization of digital health infrastructures.

GM/MS Ordinances No. 3,232/2024[15] and No. 3,691/2024[13] consolidate digital transformation as a strategic pillar of the Unified Health System (SUS). By establishing the SUS Digital Program, these regulations directly impact the current regulatory framework, promoting amendments to GM/MS Consolidation Ordinances No. 5[28] and GM/MS No. 6[29] of 2017, in order to institutionalize and fund the new technological guidelines at the national level. These instruments guide the development of state and municipal action plans, promote system interoperability, the incorporation of technological innovations, and the expansion of telehealth as a strategy for access and efficiency[15,25]. From an administrative standpoint, these ordinances represent a significant effort toward federal coordination and the promotion of digital health policies.

However, as they are sub-legal acts, these regulations have limited scope with regard to the consolidation of rights, democratic principles, and structural mechanisms for social participation in digital governance. Although the Ministry of Health has specific regulations aimed at professional training and expanding access to technology, the ordinances establishing the SUS Digital Program merely mention these areas in general terms. They fail to establish robust mechanisms for public deliberation on the direction of digitization, nor do they guarantee the active participation of users and communities in defining the priorities of digital platforms. This gap becomes particularly evident when contrasted with the concept of digital popular sovereignty, which presupposes not only data protection and access to information but also collective control and decision-making power over the technologies that mediate social life and health care[8].

At the state and municipal levels, the absence of specific legislation on digital health in Pará and in the municipality of Belém highlights the regulatory dependence on the federal level. Despite the existence of GM/MS Ordinance No. 3,534[24], dated April 12, 2024, which approves the participation of states, the Federal District, and municipalities in receiving financial incentives for the SUS Digital Program. There are no targeted initiatives that give the Amazon region the territorial importance it requires when considering the digital context. Local initiatives, such as telemedicine programs and municipal digital platforms, operate primarily as administrative extensions of national guidelines, without the creation of their own legal frameworks that incorporate the territorial, cultural, and sociopolitical specificities of the Amazon region of Pará. This regulatory gap undermines the possibility of building a context-specific digital governance framework capable of addressing regional inequalities and asserting local forms of sovereignty over data, technologies, and decision-making processes.

In light of these analyses, it is observed that the regulatory frameworks for digital health in Brazil have made significant progress in the technical and legal institutionalization of the SUS's digitization, but remain limited when confronted with critical approaches that emphasize the political, territorial, and subjective dimensions of technologies. "Metapresence," as a concept that problematizes hybrid forms of presence and care mediated by digital technology, remains absent from the legal vocabular, revealing a gap between the concrete experience of individuals and its normative translation. Similarly, digital coloniality is not explicitly recognized as a political-regulatory issue, which hinders the development of normative strategies to address the global and internal asymmetries that permeate the digital health infrastructure.

The analyses developed throughout this study highlighted three central dimensions for a critical understanding of the digital transformation of health: the technopolitical governance of digital infrastructures, the social production of meanings regarding the digitization of care, and territorialized social participation in decision-making processes. Based on the analyses conducted, we propose a model for a Digital Health Observatory structured around three interconnected pillars: I) technopolitical monitoring, focused on the critical analysis of digital health policies, platforms, and infrastructure; II) the production of meaning, centered on investigating the narratives that legitimize digitization, such as those associated with innovation and efficiency; and III) social and territorial participation, aimed at promoting spaces for listening and the co-production of knowledge with users, workers, and communities. This observatory model is linked to the PET-Saúde/I&SD program and is operated by an interdisciplinary team composed of researchers, students, and professionals from the Unified Health System, with the potential to collaborate with managers and social

movements. It is therefore proposed that the critical conceptual models presented thus far serve as guidelines for the production of analytical reports, the development of training activities, and public advocacy in the debate on the digital transformation of healthcare.

From an operational standpoint, the three proposed axes translate into concrete strategies for action. The technopolitical monitoring axis can be implemented through the creation of analytical dashboards, systematic tracking of digital health indicators (such as connectivity, system usage, and telehealth), and critical analysis of regulations and platforms currently being implemented within the SUS. The "meaning-making" pillar can take the form of qualitative studies, discourse analyses, and the production of interpretive bulletins that examine the narratives guiding digitization, including their effects on care practices and relationships between users and professionals. The social and territorial participation axis, in turn, can be developed through the creation of local forums, workshops with workers and users, coordination with health councils, and participatory research methodologies, thereby fostering the co-production of situated knowledge. In terms of implementation, the observatory can operate through continuous cycles of data collection, analysis, and public dissemination of information, supported by open digital platforms and integrated with institutional initiatives.

Final Considerations

The digital transformation of health care is a process inextricably linked to contemporary democratic debates, reshaping care practices, forms of governance, and the regimes governing the production and circulation of data within the SUS.

Although Brazil has made significant progress in institutionalizing digital health particularly through national strategies and the consolidation of infrastructure such as the National Health Data Network the analyzed results show that these advances are unevenly distributed across regions. Recent data from the TIC Saúde survey show that, in the Northern Region, despite high connectivity coverage, significant limitations persist regarding the quality of infrastructure, the use of analytical technologies and systems integration, revealing a digitization process that is still in its early stages and heterogeneous.

Another relevant finding from the ICT in Health survey data is that, although there has been progress in the provision of infrastructure for digital care and in making online services available to users, official monitoring still lacks specificity. Professional usage indicators are predominantly concentrated in the fields of medicine and nursing, without detailing the practices and digital engagement of fields such as physical therapy, psychology, nutrition, and social work, among others. This lack of segmented data reinforces the argument that the digital transformation of the SUS still lacks an integrated and participatory vision that takes into account the diversity of professional practices and the subjective experiences of the communities served by multidisciplinary teams.

These inequalities become particularly critical in the Amazon region of Pará, where geographic, social, and structural factors intensify the challenges of implementing digital policies, highlighting the need for territorialized approaches that are sensitive to local specificities. At the same time, there is a lack of established institutional mechanisms dedicated to the critical monitoring of digital health in the region, particularly those capable of integrating technopolitical analysis, knowledge production, and social participation.

In this context, the proposal for a Digital Health Observatory structured around the pillars of technopolitical monitoring, the production of meaning, and social and territorial participation is not merely an analytical possibility, but a necessary response to the strategic moment of implementing the SUS Digital policy. Such a mechanism has the potential to critically monitor the ongoing digital transformation, produce situated analyses of its impacts, and contribute to the democratization of governance over health technologies.

In this sense, the importance of research and investigations that can assess the relevance and substance of the ethical horizons proposed in this study is demonstrated—such as health residency programs, experience reports from educational institutions, and even technical guidelines developed by professional councils and government agencies. The co-construction of Digital Health in Brazil—and, more specifically, in northern Brazil—is still an emerging phenomenon that could benefit from an observatory engaged with ethical-political horizons and with forums of practice and experience that are rarely visible but which are equally integral to the SUS.

Thus, the Digital Health Observatory serves as a strategic tool for strengthening the democratic dimension of the SUS's digital transformation, for the collaborative production of data, as well as for proposing decentralized and community-driven critical analyses, where the challenge lies in building a just and territorially sensitive digital governance framework.

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K.V.B. Cavalcante: data analysis and interpretation and writing of the article.
A.C. Duarte: data analysis and interpretation and writing of the article.
J.Q. Trindade: writing of the article.
M.V.S. da Silva: conception/design of the article, critical review of its content, and approval of the final version of the article.

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