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## Between the promise of innovation and the abyss of inequality: the digital paradox in Brazil's Unified Health System (SUS) in Rio de Janeiro

*Entre a promessa de inovação e o abismo da desigualdade: o paradoxo digital no SUS no Rio de Janeiro*

*Entre la promesa de la innovación y el abismo de la desigualdad: la paradoja digital en el SUS en Río de Janeiro*

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### Abstract

The article addresses the paradox of SUS digitalization in Rio. The author acknowledges advances like telehealth and e-SUS APS but warns that without digital inclusion and democratic governance, innovation deepens inequalities. Lack of connectivity and digital literacy creates "exclusionary inclusion," restricting access to a few. It argues technology must serve the territory, with infrastructure, social participation, algorithmic transparency, and open-source development, so the digital SUS can care for everyone, especially the vulnerable.

Keywords: digital health; Unified Health System (SUS); social inequality; digital governance; telehealth.

Volume  
14

Issue  
2

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Published 28 Jun 2026

**Citation**  
BEHRING, L. P. B. *Between the promise of innovation and the abyss of inequality: the digital paradox in Brazil's Unified Health System (SUS) in Rio de Janeiro. Coleção Estudos Cariocas*, v. 14, n. 2, 2025.  
DOI: 10.71256/19847203.14.2.248.2026.

*The article was originally submitted in PORTUGUESE. Translations into other languages were reviewed and validated by the authors and the editorial team. Nevertheless, for the most accurate representation of the subject matter, readers are encouraged to consult the article in its original language.*

### Resumo

O artigo aborda o paradoxo da digitalização do SUS no Rio. A autora reconhece avanços como telessaúde e e-SUS APS, mas alerta que, sem inclusão digital e governança democrática, a inovação aprofunda desigualdades. A falta de conectividade e letramento digital gera "inclusão excludente", restringindo o acesso a poucos. Defende-se que a tecnologia sirva ao território, com infraestrutura, participação social, transparência algorítmica e código aberto, para que o SUS digital cuide de todos, especialmente os vulneráveis.

Palavras-chave: saúde digital; SUS; desigualdade social; governança digital; telessaúde.

### Resumen

El artículo aborda la paradoja de la digitalización del SUS en Río. La autora reconoce avances como la telesalud y el e-SUS APS, pero advierte que, sin inclusión digital y gobernanza democrática, la innovación profundiza desigualdades. La falta de conectividad y alfabetización digital genera "inclusión excluyente", restringiendo el acceso a pocos. Se defiende que la tecnología sirva al territorio, con infraestructura, participación social, transparencia algorítmica y código abierto, para que el SUS digital cuide a todos, especialmente a los vulnerables.

Palabras clave: salud digital; Sistema Único de Salud (SUS); desigualdad social; gobernanza digital; telesalud.



Rio de Janeiro, a city of beauty and chaos, and its Metropolitan Region carry in their geography the materialization of Brazilian inequality. I, who was raised in Madureira, know this well: while some places boast first-world infrastructure, others live daily with urban disorder, lack of sanitation, and violence. In this scenario, the bet on digital technologies in the Unified Health System (SUS) emerges as a double-edged sword. If, on one hand, telemedicine, regulation apps, and information systems promise qualitative leaps in management and access, on the other, they lay bare the structural fractures of a metropolis where digital inclusion is still a privilege. Starting from an already common and simplistic view, in the Rio de Janeiro Metropolitan Region, the digitalization of health without parallel policies for connectivity and democratic governance runs the risk of producing an “excluding inclusion,” modernizing the service for the few while deepening the chasm for the majority.

However, the issue goes beyond everyday perception and finds growing support in the national and international scientific literature on Digital Health. The World Health Organization (WHO), in its Global Strategy on Digital Health 2020–2025, highlights that the digital transformation of health systems must be guided by the principles of equity, inclusion, and universal access, warning that technological expansion without inclusion policies can widen existing inequalities. Similarly, researchers in the field of Public Health have shown that the so-called digital exclusion in health currently constitutes an important social determinant of access to health services.

I cannot deny the advances. As a professional, I was part of the team that led and implemented recent initiatives in the area, which point toward a path. I worked actively on the regulation of telehealth in the state of Rio de Janeiro, and in 2026, as a state deputy, I was able to introduce Bill No. 7083/2026 at Alerj, which provides for the practice of telehealth in the state of Rio de Janeiro, authorizing remote care in public and private networks and defining parameters for the use of assistive technologies.

This proposal encompasses everything from the secure transmission of data to patient follow-up and seeks to consolidate the lessons learned during the pandemic, organizing the use of these tools in the state. This is a movement aligned with the transformations observed internationally, where several countries have been structuring national digital health policies to expand access, qualify care, and strengthen their health systems. In Brazil, this movement finds support in the Digital Health Strategy for Brazil 2020–2028, which establishes guidelines for interoperability, information security, telehealth, and strengthening of the National Health Data Network (RNDS), reinforcing the need for a sustainable, citizen-centered digital transformation.

However, I bring a warning: the existence of bills and successful experiences, such as e-SUS APS and the work of committed professionals, does not automatically translate into universal access. The absence of democratic governance of technological decisions persists as a blind spot. And that is why speaking on this topic with due authority – as someone who works with urgent and emergency care and with management – is relevant.

During the Covid-19 pandemic, Telemedicine in the SUS prevented immediate collapses, allowing patients with chronic diseases to be monitored remotely. The e-SUS APS is a Ministry of Health strategy composed of integrated digital tools, such as the Citizen's Electronic Health Record (PEC), a free software that allows the longitudinal recording of health information for each patient attended at Basic Health Units. The ecosystem also includes support applications, such as e-SUS Território, used by Community Health Agents to manage families in their areas of operation, and e-SUS Vacinação, which assists in recording immunizations. When implemented robustly, in a centralized architecture that guarantees simultaneous, real-time access across the entire network, the system allows the daily sending of data to the state and federal levels, feeding the National Health Data Network (RNDS) and enabling digital prescriptions and citizen access to their health history through the “Meu SUS Digital” app. Adoption of this tool, which is now the country's

main electronic health record and has already been implemented in more than 4,000 municipalities, has grown exponentially in recent years, rising from 8,930 health facilities in 2017 to 26,091 in 2022.

From the perspective of Health Technology Assessment (HTA), however, the expansion of a technology should not be analyzed only through indicators of adoption or coverage. National and international methodological guidelines recommend that health technologies also be evaluated regarding their effectiveness, organizational impact, acceptability by users, economic sustainability, and contribution to reducing health inequalities. Thus, the success of e-SUS APS depends not only on the computerization of units but on its capacity to qualify care and promote greater equity in access to services. And it is precisely at this point that a challenge frequently neglected by public policies emerges: connectivity is not universal.

Although the most recent data from the Brazilian Institute of Geography and Statistics (IBGE) and the Regional Center for Studies on the Development of the Information Society (Cetic.br) indicate significant advances in expanding internet access in Brazil, important inequalities persist related to income, education, age group, and geographic location. Physical access to the internet, therefore, does not automatically eliminate the barriers to using digital health services.

In practice, access inequalities manifest in different ways. There are territories where the mobile internet signal remains unstable or economically inaccessible for a portion of the population. In many households, the cell phone is still shared among several family members, while digital literacy remains limited among the elderly and people with lower educational attainment. The teleconsultation, presented as an agile solution, becomes a labyrinth for those who do not know how to download an app or lack sufficient mobile data. The teleconsultation, presented as an agile solution, becomes a labyrinth for those who do not know how to download an app or do not have enough mobile data.

Recent studies introduce the concept of digital health literacy, defined as the ability to seek, understand, evaluate, and use digital information for health-related decision-making. Evidence shows that older adults, people with low educational attainment, and socially vulnerable populations face greater difficulties in using applications, digital platforms, and remote services, which may limit the expected benefits of digital transformation.

More gravely: the partial replacement of in-person care with digital care transfers the cost and responsibility of being connected to the citizen. In an unequal metropolis, innovation without a material foundation becomes a privilege for those who already have access to the digital asphalt.

This technological chasm generates what researchers call “double exclusion.” First, the citizen is already socially excluded due to distance, violence, or lack of transportation. Then, they are excluded again when the digital system fails or when telemedicine does not replace the need for humanized in-person care. The paradox reveals itself cruelly: technology, which should bring people closer, ends up selecting who can benefit from it.

At the same time, it is important to recognize that the scientific literature also points to relevant benefits associated with telehealth. Systematic reviews and economic evaluations conducted in several countries have demonstrated a reduction in travel, expanded access to specialists, improved monitoring of chronic diseases, and greater efficiency in the use of health system resources. The challenge, therefore, does not lie in the technology itself, but in how it is implemented and distributed among different population groups. And in a metropolis where the chronic lack of regulation vacancies is chronic, an app that does not work or a health record that does not sync can mean the difference between life and death.

If innovation and access already pose challenges, the governance of technological decisions is the Achilles’ heel of the SUS in Rio de Janeiro. Historically, the

procurement of digital systems in Rio de Janeiro has been marked by suspicions of overpricing, dubious interoperability, and market logics that ignore the real needs at the frontline.

Digital governance has been identified by international bodies as one of the fundamental pillars of digital transformation in health. Beyond the technical aspects, it involves mechanisms for transparency, social participation, institutional accountability, and control of information flows. In universal health systems, such as the SUS, digital governance must be aligned with the constitutional principles of universality, comprehensiveness, and equity.

Often, a new application is launched without adequate training for community health agents or without consulting the population on which features would be priorities.

As if the structural challenges were not enough, the very construction of a regulatory framework for digital health is still in its infancy. There is a lack of transparency about the algorithms that define priorities in bed regulation or medication distribution. Who guarantees that these systems do not reproduce racist or classist biases?

The concern is not merely theoretical. International studies on artificial intelligence and algorithmic governance have identified situations in which predictive models reproduced inequalities pre-existing in the databases used for their training. Such evidence reinforces the need for audit mechanisms, continuous validation, and transparency in the decision-support systems used in health.

Who controls the sensitive data of millions of Rio residents stored in private clouds? In this regard, the General Personal Data Protection Law (LGPD) represents an important advance for the protection of health information. However, its implementation in the daily life of public services still requires investments in infrastructure, professional qualification, and strengthening of institutional monitoring and oversight capacities.

Digital governance in the SUS should be participatory, intersectoral, and publicly auditable. However, what is seen is a concentration of technical power in the hands of a few managers and supplier companies, with rare participation of health councils and end users. In an unequal city, the absence of democratic governance turns technology into a tool of bureaucratic control, not of care liberation.

This is in no way about rejecting digital technologies — that would be a personal and professional contradiction on my part. Solid initiatives such as e-SUS APS, which is already a reality in thousands of municipalities, or the regulatory advance such as the one I presented are important steps, but they will only make sense if accompanied by robust policies for universal digital inclusion (free internet as a right, public equipment, digital literacy).

From the perspective of Health Technology Assessment, such investments should not be seen merely as additional expenses, but as structuring components of the technology itself. After all, a teleconsultation only produces social value when the citizen has the concrete conditions to access it. Evaluating digital health technologies implies considering not only software and platforms but also human resources, connectivity, professional training, and the infrastructure necessary for their use.

Otherwise, telemedicine and SUS apps will become yet another vector of segregation. It is necessary to invert the logic: before imposing top-down technological solutions, one must invest in connectivity in favelas and peripheries as essential infrastructure, just like water and electricity.

Furthermore, governance must be reinvented. If digital inclusion is a condition for access, democratic governance is a condition for the legitimacy of technological transformations. This means demanding digital health councils, open source code for critical systems, and citizen auditing of algorithms. Rio de Janeiro has the potential to be a laboratory for inclusive digital health, but this will only happen if

technology serves the territory, and not the other way around. As long as there is a patient who spends hours in a queue only to find out that their teleconsultation was cancelled due to a system failure, and a patient who can schedule their follow-up via an app in three clicks, innovation will have failed in its most elementary purpose: caring for everyone, especially those who need it most.

The future of digital health in Rio de Janeiro will depend on the ability to build hybrid models of care, in which in-person care and digital tools act in a complementary manner. The scientific literature shows that the best results are achieved when technology strengthens the relationship between professionals and users, and not when it seeks to replace it. In this sense, innovation and humanization should not be understood as opposing concepts, but as inseparable dimensions of a truly inclusive health system.

More than incorporating new tools, the challenge consists of ensuring that their benefits are distributed equitably. The digital transformation of the SUS will only be successful if it is accompanied by investments in connectivity, digital literacy, data protection, professional qualification, and democratic governance mechanisms. Otherwise, we run the risk of modernizing systems without transforming realities.

The digital SUS needs less market logic and more commitment to its founding principles. It needs more listening to health professionals, users, and territories. After all, technology only fulfills its social function when it expands rights, reduces inequalities, and strengthens care for all.

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## About the Author

Lilian Behring is a nurse with nearly 30 years of experience, holds a PhD in Cardiovascular Nursing, and is a permanent faculty member of the Master's in Telehealth at UERJ, with vast practical experience in the field: she coordinated projects such as the SIG (Special Interest Group) in Intensive Care and High Complexity Nursing of the University Telemedicine Network (RUTE) and courses in the Telessaúde Brasil program, Rio de Janeiro hub, demonstrating a pioneering trajectory at the intersection of nursing and technology. She currently holds the elective office of state deputy in Rio de Janeiro.

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Conceptualization, L.P.B.B.; formal analysis, L.P.B.B.; investigation, L.P.B.B.; writing—original draft preparation, L.P.B.B.; writing—review and editing, L.P.B.B.

## Conflicts of Interest

The author declares no conflict of interest.

## About *Coleção Estudos Cariocas*

*Coleção Estudos Cariocas* (ISSN 1984-7203) is a publication dedicated to studies and research on the Municipality of Rio de Janeiro, affiliated with the Pereira Passos Institute (IPP) of the Rio de Janeiro City Hall.

Its objective is to disseminate technical and scientific production on topics related to the city of Rio de Janeiro, as well as its metropolitan connections and its role in regional, national, and international contexts. The collection is open to all researchers (whether municipal employees or not) and covers a wide range of fields — provided they partially or fully address the spatial scope of the city of Rio de Janeiro.

Articles must also align with the Institute's objectives, which are:

1. to promote and coordinate public intervention in the city's urban space;
2. to provide and integrate the activities of the city's geographic, cartographic, monographic, and statistical information systems;
3. to support the establishment of basic guidelines for the city's socioeconomic development.

Special emphasis will be given to the articulation of the articles with the city's economic development proposal. Thus, it is expected that the multidisciplinary articles submitted to the journal will address the urban development needs of Rio de Janeiro.