

POTENTIALITIES AND CHALLENGES OF THE INFORMATION SYSTEMS IN PRIMARY HEALTH CARE VACCINATION ROOMS

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ABSTRACT

Objective: To investigate the potentialities and challenges of information systems used in Primary Health Care vaccination rooms in municipalities of the Maciço de Baturité, Ceará, from December 2024 to January 2025.

Methods: This is a descriptive, cross-sectional, observational, and quantitative study, conducted between December 2024 and January 2025 in 23 vaccination rooms of the Primary Health Care system in Itapiúna, Capistrano, Aracoiaba, and Acarape/Ceará. Data collection took place in two stages: application of a structured questionnaire and systematic observation using a script adapted from the Vaccination Room Supervision Instrument Assessment Program (PAISS). Donabedian's dimensions of structure and process guided the analysis, which was performed in Microsoft Excel for tabulation and in the Statistical Package for the Social Sciences for calculating frequencies and measures of central tendency.

Results: It was found that 82.61% of the rooms use the National Immunization Program Information System (SI-PNI) and systems integrated with the Primary Care Information System (SISAB), demonstrating progress in the services computerization. However, weaknesses were observed in the completion of specific forms for adverse events (62.22%) and in the evaluation of suspected immunobiologicals (52.17%), as well as low participation of the entire team in monitoring routines (26.09%).

Conclusions: The functional adequacy of health information systems in the analyzed context was verified, although limitations persist regarding the strategic use of data and the consolidation of systematic monitoring and surveillance routines in primary health care vaccination rooms.

DESCRIPTORS: Health Information Systems. Immunization Programs. Primary Health Care. Public Health Surveillance. Nursing.

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POTENCIALIDADES E DESAFIOS DOS SISTEMAS DE INFORMAÇÃO EM SALAS DE VACINAÇÃO DA ATENÇÃO PRIMÁRIA À SAÚDE

RESUMO

Objetivo: Investigar as potencialidades e os desafios dos sistemas de informação utilizados nas salas de vacinação da Atenção Primária à Saúde em municípios do Maciço de Baturité, Ceará, no período de dezembro de 2024 a janeiro de 2025.

Métodos: Trata-se de um estudo descritivo, transversal, observacional e quantitativo, realizado entre dezembro de 2024 e janeiro de 2025 em 23 salas de vacinação da Atenção Primária à Saúde de Itapiúna, Capistrano, Aracoiaba e Acarape/Ceará. A coleta de dados ocorreu em duas etapas: aplicação de questionário estruturado e observação sistemática com roteiro adaptado do Programa de Avaliação do Instrumento de Supervisão em Sala de Vacinação (PAISS). As dimensões de estrutura e processo de Donabedian orientaram a análise, realizada no Microsoft Excel para tabulação e no Statistical Package for the Social Sciences para cálculo de frequências e medidas de tendência central.

Resultados: Identificou-se que 82,61% das salas utilizam o Sistema de Informação do Programa Nacional de Imunizações (SI-PNI) e sistemas integrados ao Sistema de Informação da Atenção Básica (SISAB), demonstrando avanços na informatização dos serviços. Contudo, foram observadas fragilidades no preenchimento de formulários específicos para eventos adversos (62,22%) e na avaliação de imunobiológicos sob suspeita (52,17%), além de baixa participação de toda a equipe nas rotinas de monitoramento (26,09%).

Conclusões: Verificou-se adequação funcional dos sistemas de informação em saúde no contexto analisado, embora persistam limitações quanto ao uso estratégico dos dados e à consolidação de rotinas sistemáticas de monitoramento e vigilância nas salas de vacinação da Atenção Primária à Saúde.

DESCRIPTORIOS: Sistemas de Informação em Saúde. Programas de Imunização. Atenção Primária à Saúde. Vigilância em Saúde Pública. Enfermagem.

POTENCIALIDADES Y DESAFIOS DE LOS SISTEMAS DE INFORMACIÓN EN LAS SALAS DE VACUNACIÓN EN ATENCIÓN PRIMARIA DE SALUD

RESUMEN

Objetivo: Investigar las potencialidades y los desafíos de los sistemas de información utilizados en las salas de vacunación de la Atención Primaria de Salud en municipios del Maciço de Baturité, Ceará, en el período de diciembre de 2024 a enero de 2025.

Métodos: Se trata de un estudio descriptivo, transversal, observacional y cuantitativo, realizado entre diciembre de 2024 y enero de 2025 en 23 salas de vacunación del sistema de Atención Primaria de Salud de Itapiúna, Capistrano, Aracoiaba y Acarape/Ceará. La recolección de datos se realizó en dos etapas: aplicación de un cuestionario estructurado y observación sistemática mediante un guión adaptado del Programa de Evaluación del Instrumento de Supervisión de Salas de Vacunación (PAISS). Las dimensiones de estructura y proceso de Donabedian guiaron el análisis, que se realizó en Microsoft Excel para la tabulación y en el *Statistical Package for the Social Sciences* para el cálculo de frecuencias y medidas de tendencia central.

Resultados: Se identificó que el 82,61% de las salas utilizan el Sistema de Información del Programa Nacional de Inmunizaciones (SI-PNI) y sistemas integrados al Sistema de Información de Atención Primaria (SISAB), demostrando avances en la informatización de los servicios. Sin embargo, se observaron debilidades en el relleno de formularios específicos para eventos adversos (62,22%) y en la evaluación de inmunobiológicos sospechosos (52,17%), además de baja participación de todo el equipo en las rutinas de monitoreo (26,09%).

Conclusiones: Se verificó la adecuación funcional de los sistemas de información en salud en el contexto analizado, aunque persisten limitaciones en cuanto al uso estratégico de los datos y la consolidación de rutinas sistemáticas de seguimiento y vigilancia en las salas de vacunación de la atención primaria de salud.

DESCRIPTORIOS: Sistemas de Información en Salud. Programas de Inmunización. Atención Primaria de Salud. Vigilancia en Salud Pública. Enfermería.

INTRODUCTION

In recent decades, Health Information Systems (HIS) have assumed a strategic role in the management and planning of Primary Health Care (PHC) actions in Brazil. In the field of immunization, these systems are fundamental for recording and monitoring vaccination coverage, tracking the stock of immunobiologicals, and supporting decision-making in health services¹.

In the field of immunization, the HISs play a central role in vaccination coverage monitoring, surveillance of adverse events, and management of supplies and immunobiologicals. Historically, the National Immunization Program Information System (*SI-PNI*) has been the main tool used for recording and monitoring vaccination actions in the country, encompassing national campaigns and activities carried out in vaccination rooms (in Brazil, a semi-critical environment, preferably located in PHC units, intended exclusively for the development of immunization actions, designed to guarantee the storage, preservation, preparation, and administration of immunobiologicals, following technical safety and hygiene standards established by the *PNI*) at different levels of care².

In recent years, there has been a noticeable incorporation of new technologies, most notably the Electronic Citizen's Medical Record (*PEC*), integral part of the e-SUS APS system (a Ministry of Health strategy to computerize PHC), which has centralized the registration of routine vaccines administered in PHC vaccination rooms. This integration aims to improve data traceability, promote interoperability between systems, and strengthen the use of information for local planning and service management³.

The management and operation of vaccination rooms are the responsibility of the nursing teams, who must follow the guidelines established by the Ministry of Health and the Federal Nursing Council. In this context, it is important for services to identify their weaknesses and adopt strategies that enable user-centered care, promoting qualified access to health services and, consequently, to immunization⁴.

The effectiveness of using these systems, however, relies on adequate structural conditions, well-defined organizational processes, and properly trained professionals, which still represents a challenge for many Brazilian municipalities, especially small ones with limited infrastructure⁵. In these locations, factors such as staff turnover, weaknesses in supervision routines, and poor connectivity compromise the full use of HIS as tools to support the management and monitoring of immunization actions⁶.

In various international contexts, it has been observed that strengthening electronic immunization systems has contributed to improving data quality and expanding vaccination coverage. Experiences developed in countries such as Pakistan, the Republic of Korea, and the United States demonstrate that computerization facilitates real-time monitoring, reduces operational errors, and optimizes the planning of vaccination campaigns. However, these studies also indicate that the effectiveness of these systems depends on structural and organizational factors, such as adequate infrastructure, technical leadership, inter-institutional integration, and the consolidation of a data usage culture^{7,8,9,10}.

In the Brazilian context, the Maciço de Baturité region, in the state of Ceará, constitutes an emblematic territory for research. Consisting of small municipalities such as Itapiúna, Capistrano, Aracoiaba, and Acarape, it presents socioeconomic characteristics that directly influence the implementation of health policies and the effective use of information technologies. Understanding the strengths and weaknesses in the use of HISs in small municipalities contributes to improving the management of vaccination campaigns and strengthening surveillance and care practices in PHC⁶.

Given the context, this study had as objective to investigate the potentialities and challenges of information systems used in PHC vaccination rooms in municipalities of the Maciço de Baturité, Ceará, from December 2024 to January 2025.

METHOD

This is a descriptive, observational, cross-sectional study with a quantitative approach.

The research was conducted in four municipalities in the state of Ceará located in the Maciço de Baturité: Itapiúna, Capistrano, Aracoiaba and Acarape. This region in the interior of Ceará is predominantly composed of small municipalities with challenging socioeconomic indicators. Limitations such as low technological density, connectivity failures, shortage of qualified professionals, and the absence of standardized routines hinder the effective use of HISs as tools to support the management and evaluation of vaccination actions.

The choice of the region was therefore based on the challenges faced by small municipalities, especially regarding the organization and operation of vaccination centers, which are often marked by structural and operational limitations⁶.

The study population consisted of nursing professionals working in the vaccination rooms of PHC Units in the participating municipalities. The sampling method used was non-probabilistic, of the purposive convenience type.

The study included professionals who were actively working in vaccination rooms at the time of data collection and who agreed to participate by signing the Free Informed Consent Form. Ten (10) rooms were excluded from the sample due to the absence of professionals – owing to vacation, leave, or other forms of unavailability - as well as those who did not consent to the research ethical terms.

Recruitment took place in person, during visits previously authorized by the Municipal Health Departments, ensuring access to the units and direct invitations to potential participants. At the event, the research was presented, with an explanation of its objectives, benefits, risks, data collection procedures, and how the data obtained would be used, ensuring the understanding and voluntary consent of the professionals involved.

Although no minimum length of service was established as a formal inclusion criterion, it was later found that all participants had at least three years of experience in PHC. This characteristic helped to reduce potential biases associated with professional inexperience and lack of familiarity with the information systems used in vaccination routines.

Twenty-three of the 33 existing vaccination rooms in the municipalities were studied, distributed as follows: 6 out of 6 in Itapiúna, 6 out of 9 in Capistrano, 8 out of 13 in Aracoiaba, and 3 out of 5 in Acarape. Of these, 22 were conducted by nursing technicians, including one professional with nursing undergraduate course who, nevertheless, was working as a technician.

Data collection took place between December 2024 and January 2025, and consisted of two complementary stages.

In the first stage, a structured questionnaire with closed and open-ended questions was applied to nursing professionals through interviews in their respective vaccination rooms, with the aim of characterizing the participants' profile. The variables included age, sex, years since graduation, years of experience in healthcare and vaccination rooms, as well as participation in training programs.

In the second stage, systematic observation of the vaccination rooms was carried out, based on a script with closed questions, stemming from the *PlanificaSUS* instrument, adapted from the *PA/ISS*¹¹. The instrument, validated and made available by the Ministry of Health, has been updated in accordance with the standards of the National Immunization Program (*PNI*), including the Cold Chain Manual and Ordinance No.2,499/2019¹², focusing on the "Information Systems" axis.

The application was carried out during on-site visits, allowing the identification of variables related to physical structure, technological infrastructure, use of computerized systems, procedures for recording and supervising vaccination data, as well as routines for analyzing the information.

Data analysis was conducted using descriptive statistics, employing Microsoft Excel 2016 for initial tabulation and organization and the software Statistical Package for the Social Sciences (SPSS), version 25.0, for calculating absolute and relative frequencies and measures of central tendency.

The dimensions of structure and process, as proposed by Donabedian¹³, were used as conceptual axes of analysis, allowing for the organization and interpretation of results in a systematic way, without the intention of constituting a normative evaluation. To systematize the observed variables, Chart 1 was developed, which presents a synthesis of the empirical elements considered in the dimensions of structure and process.

Chart 1 – Dimensions and variables used in the study for the analysis of Health Information Systems.

Dimension	Variables	Description
Structure	- Availability and use of Information Systems (<i>SI-PNI</i> and integrated systems); - Vaccination room infrastructure for informational support; - Training of professionals to operate the systems.	This refers to the physical, human, and organizational resources that support the implementation of health actions. In this dimension, the study evaluates the presence of the systems, the adequacy of the physical environment, and the technical training of the teams responsible for vaccination.
Process	- Registration, supervision and analysis of vaccination data; - Use (or non-use) of information for management and decision-making; - Existence (or absence) of standardized routines and protocols.	This refers to the activities and practices carried out in the health service. In this dimension, the focus of the study is on how information systems are used in everyday life, including workflows, the managerial use of data, and adherence to standardized practices.

Source: based on Donabedian¹¹.

Thus, the methodological design allowed a comprehensive understanding of the use of information systems in vaccination rooms, ensuring rigor in data collection and analysis, as well as adherence to the ethical principles of research, presented below.

The study was conducted in accordance with the ethical principles governing research with human subjects, having been previously authorized by the Municipal Health Departments of the four participating municipalities and approved by the Research Ethics Committee (*CEP*) of the Universidade da Integração Internacional da Lusofonia Afro-Brasileira (Unilab).

No artificial intelligence tools were used in the preparation of this manuscript.

RESULTS

Table 1 presents the characteristics of the 23 nursing professionals who participated in the study, working in vaccination rooms in the municipalities of Maciço de Baturité, Ceará. There is an absolute predominance of females, with an average age of 35.91 years (Standard Deviation/SD = 9.33), ranging from 22 to 58 years.

Regarding marital status, single professionals predominated ($n = 13$), followed by married women ($n = 6$) and other marital configurations ($n = 4$). Regarding race/skin color, 16 participants were self-identified as mixed-race, 3 as Black, and 4 as White, according to the classification adopted by the Brazilian Institute of Geography and Statistics (IBGE).

With respect to professional training, nursing technicians predominated ($n = 22$), with only one nurse ($n = 1$). Most participants completed their education at public institutions ($n = 20$), while 3 obtained their degrees from private institutions. The average length of time since graduation was 11.82 years (SD = 5.34), ranging from three to 20 years.

The mean length of time working in the healthcare field was 9.78 years (SD = 5.57), while the average length of experience in vaccination rooms was 7.43 years (SD = 5.01). Most of the professionals work exclusively in vaccination rooms (n = 19), and 4 also perform duties in other sectors.

Concerning continuing education, 17 professionals reported having participated in training related to immunization, while 6 stated that they had not participated in any.

Table 1 – Characterization of nursing professionals in vaccination rooms in the Maciço de Baturité, CE, Brazil, 2025 (n = 23).

Items	Participants (n=23)
Age [years]	
Mean	35.91
Minimum – Median – Maximum	22.00 – 36.00 – 58.00
Sex	
Female	23
Race/skin color	
Black	03
Brown	16
White	04
Marital status	
Single	13
Married	06
Other	04
Professional Category	
Nurse	01
Nursing technician	22
Training Institution	
Public	20
Private	3
Time since graduation (years)	
Mean	11.82
Minimum – Median – Maximum	3.00-11.00-23.00
Years of experience in the healthcare field	
Mean	9.78
Minimum – Median – Maximum	2.00-8.00-22.00
Years of experience working in vaccination rooms (years)	
Mean	7.43
Minimum – Median – Maximum	2.00-6.00-20.00
Currently, do you work exclusively in the vaccination room?	
Yes	19
No	4
Have you ever participated in any training programs related to immunization?	
Yes	17
No	6

Table 2 presents the aspects observed regarding the use of information systems in vaccination rooms. Data indicate that 19 units use the *SI-PNI* or the *PEC*, duly integrated with the Primary Care Health Information System (*SISAB*), and that the same number of units have professionals who know and use these systems routinely.

It is observed that all 23 vaccination rooms provide and use vaccination forms and record-keeping instruments, as well as vaccination cards or booklets for children, adults, and pregnant women. With regard to vaccination control for older people, 19 units report the use of these instruments.

The information also shows that 20 rooms prepare daily reports of doses administered and that all of them file monthly reports. Most units ($n = 22$) have control cards for individuals with scheduled vaccinations, and 21 maintain daily temperature control charts for refrigeration equipment.

Regarding documentation related to vaccine surveillance and safety, 15 rooms have forms for investigating adverse events following immunization, and 12 have forms for evaluation of immunobiological products suspected of having quality deviations.

Furthermore, 22 units keep monthly records of immunobiological movement, 17 state that the professionals responsible are proficient in completing the forms, and 21 report that the nurse supervises the technical records periodically. Monitoring of vaccination coverage indicators takes place in 22 units, while the dropout rate is tracked in 21.

Finally, 20 units reported that the professionals are familiar with and regularly discuss the available information, which demonstrates the incorporation of monitoring and data analysis routines into the daily operations of vaccination rooms.

Table 2 – Evaluation of Information Systems in vaccination rooms in the Maciço de Baturité, CE, Brazil, 2025 (n=23).

Items observed	Yes (n)	No (n)
1. The National Immunization Program System (<i>SIPNI</i>) and the Citizen's Electronic Medical Record (<i>PEC</i>) or Simplified Data Collection (<i>CDS</i>), or proprietary or third-party systems duly integrated with the Health Information System for Primary Care (<i>SISAB</i>), are implemented in the unit.	19	04
2. All professionals are familiar with and routinely use <i>SIPNI</i> and <i>PEC</i> or <i>CDS</i> , or their own or third-party systems that integrate with <i>SISAB</i> , for recording and monitoring vaccination rooms.	19	04
3. The unit provides the forms and instruments for recording vaccination-related care.	23	00
4. The room provides and uses the child's vaccination card or booklet during vaccination appointments.	23	00
5. The room provides and uses the adult's vaccination card or booklet for vaccination services.	23	00
6. The room provides and uses the pregnant woman's card or booklet for vaccination services.	23	00
7. The room provides and uses the older person's vaccination card or booklet for vaccination services.	19	04
8. The room keeps a daily report of vaccine doses administered.	20	03
9. The room produces a monthly report of vaccine doses administered.	23	00
10. The room has a control card for individuals with scheduled vaccinations for the workday, or the scheduling can be checked through an information system.	22	01

Table 2 – Cont.

Items observed	Yes (n)	No (n)
11. The room has a daily temperature control chart for the refrigeration equipment.	21	02
12. The room has a form for investigating adverse events following vaccination.	15	08
13. The room has a form for evaluating suspected immunobiologicals (of having quality deviation).	12	11
14. The movement of immunobiologicals is recorded monthly.	22	01
15. The technicians in charge are familiar with and know how to properly fill out the forms and instruments.	17	06
16. The head nurse periodically supervises the vaccination record.	21	02
17. There is a routine for monitoring and evaluating vaccination indicators.	21	02
18. The entire team participates in the monitoring and evaluation processes.	17	06
19. The vaccination coverage indicator is monitored.	22	01
20. The dropout rate indicator is monitored.	21	02
21. Professionals are familiar with and regularly discuss the available information.	20	03

The findings presented in Tables 1 and 2 allow us to outline an overview of the profile of professionals working in vaccination rooms, as well as the conditions of use and operation of Information Systems in the units investigated. These results highlight the context studied and will support the discussions presented in the following section.

DISCUSSION

The study demonstrates a sufficient degree of implementation of information systems within the organizational framework of vaccination rooms, especially concerning the standardization of records and the incorporation of structured monitoring practices. The availability of forms and recording instruments, the use of booklets for different life cycles, and the preparation of a monthly bulletin of administered doses, with full adherence within the units, demonstrate a positive aspect in favor of traceability and continuity of care¹⁴.

The consolidation of physical records, even if traditional, plays a central role in sustaining vaccination routines, especially in contexts with infrastructure limitations and limited access to digital technologies. It is noted that documentary support remains the most widely used instrument in territories marked by structural and technological limitations¹⁵.

The presence of computerized systems integrated into *S/SAB* in a large number of units represents a strength in the computerization process, indicating efforts towards the digitization and centralization of data. However, the fact that a smaller percentage of units still do not fully utilize *SIPNI* or equivalent systems demonstrates the persistence of technological and managerial gaps that impact real-time surveillance, the consolidation of indicators, and data-driven decision-making. The fragmentation of electronic records and the lack of interoperability between information systems

reduce the power of data as a tactical-operational planning tool, weakening the rapid response to outbreaks, coverage failures, or adverse events¹⁶.

It is observed that the digitization of data promotes agility in consolidating information, the reliability of indicators, and near real-time monitoring. However, the effectiveness of electronic immunization records depends on the existence of technical leadership, an institutional culture focused on data use, and continuous training of teams—essential conditions for transforming data collection into strategic and sustainable decisions¹⁰. These findings are consistent with the reality observed in this study, where technological advances still coexist with traditional practices and managerial limitations that restrict the critical use of data in local planning.

In contrast, international evidence suggests that consolidating national electronic immunization records improves both the management and monitoring of vaccination coverage. A prime example is the *Immunization Registry Information System* (IRIS) of the Republic of Korea, created in 2002 and integrated with various government databases, which allows real-time monitoring, automated sending of reminders and reduction of registration errors. The system shows consistent results, with national coverage exceeding 96% among one-year-old children, but faces structural limitations, such as the lack of direct integration between vaccination and disease records⁷. The comparison highlights that the Brazilian challenge is not only technological, but also organizational and political, involving leadership, financing, and information governance.

The use of control cards for scheduled immunization and temperature control charts, both adopted by most rooms, demonstrates the incorporation of systematic control and safety practices, especially in the chain of preservation of immunobiologicals. These practices, by combining technology and operational protocols, represent milestones of good governance in the field of immunization, as they reduce operational failures and increase the predictability of dose supply¹⁷.

Conversely, the most critical indicators relate to the effective use of post-vaccination surveillance tools. The limited availability of specific forms for evaluating suspected immunobiologicals and for investigating adverse events following immunization reveals a structural weakness that directly compromises the quality of care and users' safety. This fragility is not limited to the technical-operational dimension, but also impacts the population's access to and trust in services, such that the absence of adequate guidance, the restricted operating hours of vaccination centers, and the unavailability of immunobiologicals are perceived by users as significant barriers to adherence to vaccination⁴.

Moreover, although most units monitor vaccination indicators and professionals report discussing the data periodically, this does not necessarily mean that these indicators are being effectively used as local planning tools. The mere existence of monitoring routines does not guarantee their critical appropriation by workers, nor their incorporation into action plans and agreed-upon goals¹⁸. The instrumental use of data – often limited to fulfilling reports or external requirements – tends to diminish the transformative potential of information in the service daily routine.

A study conducted in the United States revealed that, even in highly computerized contexts, Immunization Information Systems still face structural and political barriers that limit the effective use of data. Among the main challenges are the fragmentation of information databases, the absence of national interoperability standards, and the difficulties of integration between different levels of management. These findings reinforce the idea that digital transformation, by itself, does not guarantee a culture of qualified information use, requiring governance policies, investment in training, and strengthening of the analytical culture in healthcare services⁸.

A case study conducted in Pakistan described the implementation of an electronic information system in 16 districts of the Sindh province, which combined individualized registration, automated SMS reminders, and monitoring dashboards for supervisors. Over the course of 18 months, the program recorded an increase in coverage of the third dose of the pentavalent vaccine from 27% to 64%, and

the proportion of fully immunized children from 18% to 52%. The system allowed the strategic use of data for micro-planning, vaccine logistics, and monitoring of at-risk areas, as well as promoting community engagement through educational messages. The authors highlight that the integration of digital tools, technical supervision, and social mobilization was critical for the increase in vaccination coverage and the enhancement of local governance⁹.

Therefore, the technical supervision carried out by the responsible nurse also presents itself as a promising factor, as it reinforces the role of technical coordination in ensuring the quality of the vaccination process. However, the lower level of participation from the entire team during evaluation sessions reveals a management style that is still centralized and lacks dialogue. When the performance of nursing professionals is strengthened through training and institutional support, there is greater adherence to protocols, better organization of the work process, and qualified use of information systems¹⁹.

The results of this study underscore a set of relevant practical, theoretical, and social contributions. From a practical standpoint, this work provides support for consolidating health information management, especially in improving routines for monitoring, recording, and strategically using data for decision-making at the local level.

In the theoretical field, the study broadens the debate on computerization processes in PHC, by showing combined practices of physical and digital records in the daily routine of vaccination rooms. This coexistence reveals local strategies for technological adaptation that reflect the reality of services, providing valuable clues for improving information management in contexts with limited infrastructure. In the social sphere, it contributes by revealing real work dynamics and challenges faced by nursing teams, denoting possible paths for improving the quality and safety of care.

One limitation of the study is the failure to include all existing vaccination centers in the municipalities analyzed, due to the absence or unavailability of research subjects at the time of data collection. This restricts the scope of the results in relation to all existing units in the investigated territory.

CONCLUSIONS

This study had as objective to investigate the potentialities and challenges of information systems used in Primary Health Care vaccination rooms in municipalities of the Maciço de Baturité, Ceará, from December 2024 to January 2025.

The research revealed significant progress, but also highlighted weaknesses that compromise the full use of these systems as strategic management tools. Among the identified strengths, the following stand out: the wide availability and use of physical records – such as forms and booklets –, the regular monitoring of indicators, such as vaccination coverage and dropout rates, and the implementation of the *SIPNI* and integrated systems in a large part of the units investigated. These elements create a favorable environment for traceability, continuity of care, and improvement of immunization efforts in the territory.

In contrast, the study also indicated important challenges, such as the absence of essential forms for the surveillance of adverse events and for the evaluation of suspected immunobiologicals, the partial participation of teams in monitoring and evaluation processes, and the limitation in the critical use of data to support managerial decisions. These findings indicate a need to improve work processes, with an emphasis on ongoing team training, consolidation of technical supervision routines, and promotion of a culture focused on the strategic use of information.

The contributions of this study lie in the production of empirical evidence aimed at understanding the potentialities and challenges in the use of health information systems in the context of PHC vaccination rooms. By analyzing the functioning of these strategic spaces, the study reaffirms the central role of information in organizing care and monitoring immunization actions, demonstrating how

the standardization of records and the coordinated use of physical and digital tools can strengthen the quality of local management.

Therefore, the study contributes to the debate on the processes of computerization in PHC by highlighting the coexistence of traditional and technological practices as a strategy for adapting to rural contexts. Furthermore, it provides subsidies for the improvement of public policies aimed at strengthening vaccination centers as operational hubs for health surveillance, highlighting their importance for continuity of care and for the consolidation of the Brazilian Public Health System.

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NOTES

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APPROVAL OF ETHICS COMMITTEE IN RESEARCH

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CONFLICT OF INTEREST

There is no conflict of interest.

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DATA AVAILABILITY

The data supporting the results of this study are not publicly available due to ethical restrictions related to participant privacy, but may be made available in anonymized form upon justified request to the corresponding author and ethical review.

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