Challenges and Advances in Obstetric Patient Transport: Recent Studies on Obstetric Emergencies and Ambulance Transport

NIVIA MAURO DE OLIVEIRA

Abstract- ***The studies discussed address the challenges and advances in the transport of obstetric patients in emergencies outside the hospital, emphasizing the importance of effective protocols, continuous training, and improvements in communication between healthcare professionals. The study on Protocol 24 of the Medical Dispatch Priority System reveals that, despite its well-defined structure, there are areas for adjustments, particularly regarding language used in spontaneous abortion situations. Other studies highlight the crucial role of paramedics in unplanned births outside the hospital, pointing to the need for specific training to handle maternal and neonatal complications such as excessive hemorrhages and hypothermia. The research also highlighted gaps in transport services in countries like India, where the lack of clear protocols and the underuse of ambulance services like "108" indicate the need for improvements in managing obstetric emergencies. On the other hand, in countries like the Netherlands, efficient cooperation between midwives, paramedics, and hospitals contributes to the success of transporting pregnant women, minimizing associated risks. The findings suggest that it is essential to improve existing protocols, provide continuous training for healthcare professionals, and ensure better infrastructure for emergency transport services to reduce maternal and neonatal mortality. Interprofessional collaboration and adapting practices to the local context are key to achieving better outcomes in obstetric emergencies.***

Indexed Terms- ***Obstetric emergencies, Patient transport, Medical protocols, Unplanned births, Interprofessional care.***

I. INTRODUCTION

Childbirth in transit, which occurs during the transportation of the pregnant woman to the hospital, is a highly complex situation that particularly challenges obstetric nursing professionals in pre-hospital care. The unpredictability of the moment of birth, combined with the limited conditions inside the ambulance and the emotional stress involved, demands precise technical performance, mastery of specific protocols, and a welcoming approach from professionals to ensure the safety of both the mother and the newborn.

One of the main obstacles faced by the team is the restricted environment of the ambulance. The limited physical space hampers movement and the proper execution of obstetric procedures, in addition to presenting limitations regarding available resources such as ventilation equipment, monitoring devices, and surgical instruments. In this situation, a rapid and effective assessment of the pregnant woman's condition becomes vital. The nurse must be able to identify signs of imminent delivery, such as regular contractions, rupture of the amniotic sac, and crowning, to decide whether it is safer to proceed with the birth on-site or continue quickly to the hospital.

Emotional stress is another challenging factor. The pregnant woman, often frightened and anxious, requires active psychological support. The team must adopt clear, reassuring, and empathetic

communication, demonstrating confidence in their actions to reduce the anxiety of the parturient. Furthermore, childbirth in transit involves significant maternal and neonatal risks, such as postpartum hemorrhage, neonatal asphyxia, hypothermia, and complications related to the placenta. The absence of hospital infrastructure makes it essential for the nurse to have the ability to carry out rapid and effective interventions to prevent adverse outcomes.

To handle these adversities, strictly following specific protocols is indispensable. At the beginning of the care, a quick clinical assessment must be performed, including a brief obstetric history and checking the pregnant woman's vital signs. A visual inspection to confirm the stage of labor is crucial at this moment. If the delivery is imminent, the team must sanitize their hands, use personal protective equipment, organize the necessary materials—sterile drapes, forceps, clamps, scissors, and a neonatal aspirator—and prepare a safe environment for the birth.

During delivery, the professional must support the woman's perineum to control the baby's exit and prevent lacerations. Proper guidance for the mother to push during contractions and rest between them is fundamental. After the baby's head is born, it is necessary to check for a nuchal cord and, if present, carefully slide the cord over the newborn's head. The rest of the body must be delivered gently to avoid trauma.

Immediately after birth, neonatal care must be carried out attentively. The umbilical cord should be clamped and cut with sterile material, preferably between 1 and 3 minutes after birth, respecting the concept of delayed clamping to benefit the newborn. Evaluating the baby using the APGAR method at the first and fifth minutes is necessary, as well as warming the newborn through skin-to-skin contact or the use of a thermal blanket. Airway suctioning should only be performed if there are clear signs of obstruction.

Postpartum care for the mother is equally crucial. It is essential to monitor her vital signs, observe for signs of hemorrhage, and perform control maneuvers, such as uterine massage. The expulsion of the placenta must be monitored, and the birth canal conditions should be assessed to identify lacerations. At the same time, continuous communication with the destination hospital must be maintained, informing them of the mother's and baby's conditions, as well as the procedures performed, so that the healthcare facility is prepared to receive and continue the care quickly and safely.

To ensure the effectiveness of this type of care, continuous training of the team is indispensable. Practical training and simulations of emergency deliveries inside ambulances are fundamental tools for developing agility, quick decision-making, and teamwork. Additionally, the periodic updating of protocols, based on national and international guidelines, ensures that the care provided aligns with best health practices.

It is also important to remember that even in emergency contexts, respecting ethical principles is fundamental, preserving the dignity and autonomy of the pregnant woman. Whenever possible, informed consent should be sought for procedures, ensuring humanized care. Finally, proper documentation of all events and procedures performed is essential for both medical record-keeping and the legal protection of the professionals involved.

In summary, attending to childbirth in transit requires obstetric nurses not only to have technical competence

and mastery of protocols but also sensitivity, empathy, and the ability to act under pressure. Preparing pre-hospital care teams for these scenarios is an indispensable investment to promote maternal and child safety and to reduce mortality and morbidity rates associated with out-of-hospital births.

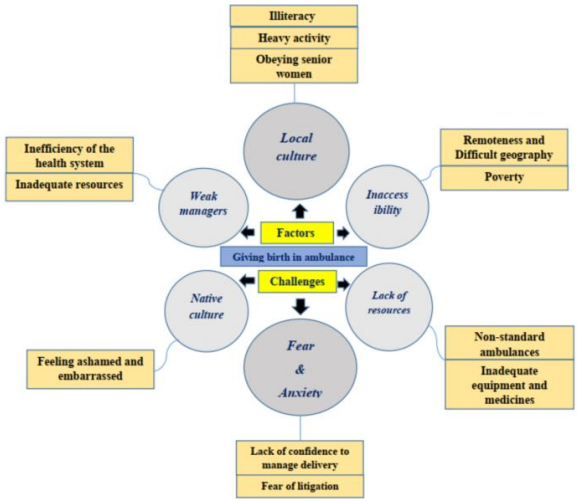

Figure 1: Factors and challenges of giving birth in ambulance.

Source: Sheikhi & Heidari (2024).

The research conducted by Hill et al. (2022) investigates the involvement of prehospital care professionals in managing out-of-hospital births (OOHBs). While intrapartum care accounts for only a small percentage of emergency medical calls, with roughly 10% of these cases progressing to delivery under the care of ambulance clinicians, the infrequent nature of such events can result in the loss of obstetric skills and knowledge, thereby affecting the quality of care provided. Furthermore, unplanned out-of-hospital births often present a higher incidence of complications such as postpartum hemorrhage and neonatal hypothermia. The scoping review proposed by Hill et al. (2022) seeks to examine these births, the complications that arise, and the experiences of birth parents, partners, and healthcare professionals, while also identifying barriers and challenges to providing optimal care. Following the methodology of the Joanna Briggs Institute and the PRISMA-ScR guidelines, the study will gather data from publicly available sources without requiring ethical approval.

In the state of Victoria, Australia, the study by McLelland et al. (2018) focuses on the role of paramedics in unplanned out-of-hospital births, addressing the increasing frequency of such occurrences over the last two decades. Paramedics, who are the primary emergency care providers outside of hospitals, play a crucial role in supporting these women and their newborns. Using retrospective data from the Victorian Ambulance Clinical Information System (VACIS®), the study analyzed 324 cases of out-of-hospital births over a 12-month period. The majority of these births were uncomplicated, but various obstetric complications, such as postpartum hemorrhage, breech presentation, cord prolapse, prematurity, and neonatal death, were recorded. A notable percentage of the mothers had medical histories that could complicate clinical management. The study emphasizes the importance of complex obstetric clinical skills among paramedics, suggesting a need for enhanced training to improve care in these situations, despite the relatively low frequency of such cases.

A study by Strózik et al. (2023) examined the role of skilled midwives in planned out-of-hospital births, focusing on the unique and empowering experience they provide to expectant parents. Retrospective data from 41,335 emergency medical service calls involving women in late stages of pregnancy between 2018 and 2022 were analyzed, identifying 209 cases

of home birth emergencies, 60 of which involved midwife assistance. The findings revealed that the most common emergency reasons for midwife-assisted births were placental issues, perinatal hemorrhage, and newborn distress. Paramedic teams conducted the majority of interventions, highlighting their vital role in supporting home births. The study stresses the importance of continuous education and proper funding to maintain high standards of emergency care for pregnant women and newborns. It also calls for adaptations in medical record forms to cater specifically to the needs of these patients.

In rural Montana, the study conducted by Fertaly et al. (2024) explores the challenges faced by healthcare providers in coordinating obstetric transport and referrals in areas without a regionalized perinatal care system. The mixed-methods research involved surveying 32 out of 34 Critical Access Hospitals (CAHs) without obstetric units and conducting interviews with hospital and emergency medical services (EMS) personnel. The findings revealed that many facilities struggled with coordinating transport, often due to the state's decentralized transport system. Adverse weather conditions, difficulty securing receiving facilities, and transport coordination issues were among the key challenges. The study highlights that the lack of formal transport protocols and transfer agreements exacerbates these difficulties, suggesting that state-level and interfacility policies could improve transport coordination and strengthen EMS support for obstetric emergencies.

The study by Hill et al. (2024) examines the perspectives of Volunteer Ambulance Officers (VAOs) in rural Australia regarding their training, experience, and confidence in managing unplanned out-of-hospital births and obstetric emergencies. Despite representing less than 1% of ambulance calls, these emergencies carry significant risks, particularly in remote areas with limited access to specialist care. Through semi-structured interviews and focus groups with 28 VAOs across six Australian states, the research identified several key issues, including low confidence due to insufficient education and exposure to obstetric emergencies, challenges in accessing necessary medical equipment, and logistical difficulties caused by long distances and unreliable telecommunications. The study emphasizes the need for continued education and support to mitigate risks and improve patient safety, particularly in the context of limited resources and backup in rural settings.

The study conducted by Shaw et al. (2024) examines the perceptions of emergency medical dispatchers (EMDs) regarding the structured protocol used in out-of-hospital obstetric emergencies, specifically the Protocol 24 of the Medical Priority Dispatch System, which covers pregnancy, labor, and miscarriage. The research aimed to evaluate the effectiveness of this protocol and identify challenges or gaps in its application. The study collected experiences about Protocol 24 through semi-structured phenomenological focus groups with 23 staff members from a UK urban ambulance service control center. Thematic analysis of the discussions revealed five main themes: perceptions of obstetric emergencies, challenges with key issues, the need for sensitivity in handling miscarriage-related calls, the utility of pre-arrival and post-dispatch instructions, and suggestions for improvements to ProQA functionality. The findings showed that, while the protocol was considered well-structured and easy to use, there were areas needing improvement, particularly regarding the language used for miscarriage and termination calls. EMDs suggested

updates to the protocol with more sensitive language and improvements in specific areas, as well as additional functionality to handle evolving situations during calls. The results highlight the complexity and rewarding nature of childbirth-related calls and emphasize the need for further research to generalize these findings to other ambulance services, especially in different countries.

In the study by McLelland, Morgans and McKenna (2014), the role of paramedics in managing unplanned births before arrival (BBAs) is analyzed. These rare but significant clinical events may see paramedics as the first healthcare professionals to attend to the situation. The review aimed to demonstrate that paramedics are not limited to transporting pregnant women but also apply clinical skills and decision-making in high-risk situations. Additionally, the study proposed strategies to better support paramedics in managing out-of-hospital obstetric emergencies. The research involved a comprehensive search of bibliographic databases such as EMBASE, MEDLINE, CINAHL, and Maternity and Infant Care from 1991 to 2012, identifying 14 relevant studies from the US, UK, and Europe. The studies revealed that paramedics attend to between 28.2% and 91.5% of BBAs, with most births being uncomplicated, though maternal and neonatal complications were still frequently reported. The study identified excessive post-birth bleeding as the most common maternal complication, while hypothermia was the most frequent neonatal complication. It concludes that paramedics should be properly educated and equipped to handle BBAs at both undergraduate and postgraduate levels and that developing protocols between healthcare and ambulance services is essential to reducing risks associated with these emergencies. Moreover, the study stresses the need for further research to better understand the incidence of BBAs and the specific management techniques used by paramedics.

The research conducted by Wiegers & de Borst (2013) explores the perceptions and experiences of both caregivers and clients regarding the organization of emergency transportation in childbirth care, focusing on communication, responsibilities, and logistics between caregivers. In the Netherlands, women with uncomplicated pregnancies may choose to give birth at home with the assistance of a midwife. However, when complications arise, rapid referral to a hospital is necessary, often with ambulance support. The study used a mixed-methods approach, including semi-structured interviews with 21 caregivers, followed by the creation of questionnaires based on the qualitative data collected. These were distributed to 181 caregiver organizations, yielding a 60% response rate from caregivers and 42 client responses. The results showed that, while cooperation between caregivers was often adequate, it was largely informal, with many professionals unaware of existing agreements or protocols and uncertain about the roles and competencies of other caregivers. Despite these challenges, most clients reported receiving excellent care at the hospital. The study concludes that, given the frequency of care transfers in the Dutch maternal healthcare system, it is essential for caregivers to know and trust one another to respond effectively in emergencies. The research recommends the development of a protocol for midwives when contacting ambulance dispatch centers, as well as promoting knowledge exchange through combined emergency obstetrics courses and improving the referral process between midwives and obstetricians.

Hill et al. (2024) explores the participation of ambulance clinicians in unplanned out-of-hospital births (OOHBs) and the experiences of both patients and clinicians in these situations. Although OOHBs are rare events, they pose significant challenges to responders. This scoping review aimed to gather and analyze existing research on the topic, focusing on clinician participation and patient experiences. The review included articles discussing unplanned OOHBs or planned home births with complications requiring emergency ambulance intervention. It included 63 articles, mostly retrospective studies published since 2015, particularly from the US and Australia. The literature identified a wide range of risk factors for OOHBs, such as maternal age and being multigravid/multiparous. The study found 99 reported complications, ranging from minor issues like nausea to life-threatening situations such as maternal or neonatal cardiac arrest. The most common interventions included assisting with delivery, maternal intravenous cannulation, and medication administration. Both patients and clinicians reported that OOHBs are anxiety-inducing events, but they become rewarding when a healthy baby is born. Effective communication by clinicians contributes to a more positive experience, though the study identified challenges to ideal care, such as the need for more education and training for clinicians, communication difficulties, environmental challenges, and technological limitations. The study concludes that, although OOHBs are rare, they require specialized assistance, highlighting the need for ongoing training and skill development to improve patient safety and clinician confidence.

The study by Singh (2018) investigates referral pathways and transportation services for pregnant women in the public health sector of India, aiming to identify strategies to strengthen the referral system for obstetric emergency care. Despite progress in institutional delivery rates in recent decades, maternal mortality remains high in India. The research included three literature reviews, a knowledge, attitudes, and practices (KAP) survey with primary healthcare staff in two states, analysis of data from the '108' ambulance service in six states, and phone interviews with women who used the service in two states. The findings revealed the absence of standard protocols or guidelines for referring women with obstetric complications, with over half of pregnant women attending primary healthcare units being referred elsewhere. The study also identified poor quality of referral care and a lack of research on the effectiveness of transportation interventions. The KAP survey indicated that healthcare professionals had suboptimal knowledge and practices regarding high-risk conditions and complications, as well as low confidence and limited resources to manage emergency situations. The '108' ambulance service was underutilized, with less than a quarter of institutional pregnancies and births utilizing it. The study concludes that obstetric care quality at peripheral health centers needs improvement, and strategies are needed to increase the use of the '108' ambulance service in obstetric emergencies, along with standardizing services at each level of care.

The study conducted by Tunay et al. (2025) explores the experiences and challenges faced by nurses during the transport of critically ill patients via ambulance. The research aimed to provide a deeper understanding of the complexities and unpredictability of care in ambulances, focusing on the experiences of nurses involved in inter-hospital transport. Using a qualitative research design with a transcendental phenomenological approach, the researchers

conducted individual interviews with 12 nurses from four hospitals in Laguna. These nurses had experience with multiple inter-hospital transports and had participated in emergency training, such as Basic Life Support and Advanced Cardiac Life Support. The data was analyzed thematically using NVivo software. The study identified three major themes: Preparation and Readiness in Transporting Critically Ill Patients, Overcoming Challenges and Adversities in Patient Transport, and Execution and Coping Strategies in Transporting Critically Ill Patients. The results revealed that nurses often face significant barriers during patient transport and use coping strategies such as prayers for hope. The study suggests that hospitals providing inter-hospital transport services should develop and implement clear and detailed guidelines and protocols to ensure patient safety during the transport process.

Finally, the study by Stolp et al. (2015) aimed to assess whether the pre-hospital 45-minute transport limit for ambulance services is met in cases of postpartum hemorrhage (PPH) following home births supervised by midwives in the Netherlands, in addition to evaluating the ambulance transport process, maternal condition during transport, and outcomes. The study used ambulance report forms and medical records to collect data on ambulance intervals, urgency coding, clinical condition (using the Revised Trauma Score, RTS), and maternal outcomes. A total of 72 PPH cases were reported between April 2008 and April 2010, with 54 cases analyzed after excluding 18. The study found that, in 63% of cases, the pre-hospital 45-minute limit was met. In 75.9% of cases, women received an RTS of 12, indicating ideal health metrics, while 24.1% showed a drop in systolic blood pressure. Despite variations in RTS and the 45-minute limit being met, no significant differences were observed in outcomes. All women fully recovered, suggesting that the well-organized obstetric and ambulance care system in the Netherlands, along with the low-risk profile of women under primary care, may have contributed to these positive outcomes.

The studies presented offer a comprehensive view of the complex situations faced in the transport of obstetric patients during emergencies outside of the hospital. The research highlights the importance of continuous training for healthcare professionals, the improvement of existing protocols, and the need for adjustments in language and approach in obstetric emergencies, such as spontaneous abortions. While the structure of protocols like the Protocol 24 of the Medical Dispatch Priority System is considered effective, areas for improvement have been identified, particularly in relation to sensitive communication and adapting the protocol to new clinical realities.

Additionally, the studies emphasize the relevance of the role of paramedics in situations of unplanned births, where specialized support can make a difference in the clinical outcome. The literature review on care provided by paramedics highlights that, although many births are uncomplicated, complications such as hemorrhages and hypothermia can occur and require a quick and efficient response. Continuous updating and training of paramedics are essential to improve care and reduce risks.

The research on the transport of pregnant women in obstetric emergencies also points out challenges due to the lack of clear protocols in the public health sector, particularly in developing countries like India. The absence of standardized guidelines and the underuse of emergency ambulance services, such as "108," indicate an urgent need for improvements in

infrastructure and training of professionals to ensure the safe transport of patients.

On the other hand, studies conducted in the Netherlands and other European countries show that efficient and fast transport, combined with clear communication between caregivers and well-established protocols, can significantly contribute to reducing risks in emergency situations. Effective cooperation between paramedics, midwives, and hospitals is crucial to ensure that pregnant women receive the necessary care in a timely manner.

In conclusion, the transport of obstetric patients in emergency situations requires not only the adoption of effective protocols but also the continuous training of healthcare professionals and the improvement of ambulance service infrastructure. The studies emphasize that to achieve better outcomes for mothers and babies, it is essential to integrate technological advances, improved communication practices, and more sensitive and personalized approaches in obstetric emergency interventions.

REFERENCES

[1] Fertaly, Kaitlin, et al. "Obstetric transport in rural settings: Referral and transport of pregnant patients in a state without a perinatal regionalized system of care." *Health Services Research* 59.5 (2024): e14365.

[2] Hill, Michella G., et al. "Out-of-hospital births and the experiences of emergency ambulance clinicians and birthing parents: A scoping review of the literature." *medRxiv* (2024): 2024-11.

[3] Hill, Michella, et al. "Out-of-hospital births and the experiences of emergency ambulance clinicians and birthing parents: a scoping review protocol." *BMJ open* 12.5 (2022): e062313.

[4] Hill, Michella G., et al. "Out-of-hospital birth training, experience and confidence of Australian rural volunteer ambulance officers." *Rural and Remote Health* 24.3 (2024): 1-10.

[5] McLelland, Gayle, et al. "Epidemiology of unplanned out-of-hospital births attended by paramedics." *BMC pregnancy and childbirth* 18 (2018): 1-9.

[6] McLelland, Gayle E., Amee E. Morgans, and Lisa G. McKenna. "Involvement of emergency medical services at unplanned births before arrival to hospital: a structured review." *Emergency Medicine Journal* 31.4 (2014): 345-350.

[7] Shaw, Joanna, et al. "Emergency medical dispatchers' experiences of using the Medical Priority Dispatch System telephone triage to identify maternity emergencies: a qualitative focus group study." *BMJ open* 14.3 (2024): e078787.

[8] Sheikhi, Rahim Ali, and Mohammad Heidari. "The challenges of delivery in pre-hospital emergency medical services ambulances in Iran: a qualitative study." *BMC Emergency Medicine* 24.1 (2024): 156.

[9] Singh, Samiksha. *Referral systems and transport for emergency obstetric care in India*. Diss. London School of Hygiene & Tropical Medicine, 2018.

[10] Stolp, Ineke, et al. "Ambulance transfer in case of postpartum hemorrhage after birth in primary midwifery care in the Netherlands: a prospective cohort study." *Birth* 42.3 (2015): 227-234.

[11] Strózik, Mateusz, et al. "EMS Interventions during Planned Out-of-Hospital Births with a Midwife: A Retrospective Analysis over Four

Years in the Polish Population." *Journal of Clinical Medicine* 12.24 (2023): 7719.

[12] Tunay, Mariel Aivee, et al. "Hatid-Kalinga: Exploring Nurses' Interhospital Transport of Critically Ill Patients via Ambulance." *Journal of Medical and Health Studies* 6.1 (2025): 115-125.

[13] Wiegers, Therese A., and Julia de Borst. "Organisation of emergency transfer in maternity care in the Netherlands." *Midwifery* 29.8 (2013): 973-980.

[14] Silva, J. F. (2024). SENSORY-FOCUSED FOOTWEAR DESIGN: MERGING ART AND WELL-BEING FOR INDIVIDUALS WITH AUTISM. *International Seven Journal of Multidisciplinary*, *1*(1). https://doi.org/10.56238/isevmjv1n1-016

[15] Silva, J. F. (2024). SENSORY-FOCUSED FOOTWEAR DESIGN: MERGING ART AND WELL-BEING FOR INDIVIDUALS WITH AUTISM. *International Seven Journal of Multidisciplinary*, *1*(1). https://doi.org/10.56238/isevmjv1n1-016

[16] Silva, J. F. (2024). Enhancing cybersecurity: A comprehensive approach to addressing the growing threat of cybercrime. *Revista Sistemática*, *14*(5), 1199–1203. https://doi.org/10.56238/rcsv14n5-009

[17] Venturini, R. E. (2025). Technological innovations in agriculture: the application of Blockchain and Artificial Intelligence for grain traceability and protection. *Brazilian Journal of Development*, *11*(3), e78100. https://doi.org/10.34117/bjdv11n3-007

[18] Turatti, R. C. (2025). Application of artificial intelligence in forecasting consumer behavior and trends in E-commerce. *Brazilian Journal of Development*, *11*(3), e78442. https://doi.org/10.34117/bjdv11n3-039

[19] Garcia, A. G. (2025). The impact of sustainable practices on employee well-being and organizational success. *Brazilian Journal of Development*, *11*(3), e78599. https://doi.org/10.34117/bjdv11n3-054

[20] Filho, W. L. R. (2025). The Role of Zero Trust Architecture in Modern Cybersecurity: Integration with IAM and Emerging Technologies. *Brazilian Journal of Development*, *11*(1), e76836. https://doi.org/10.34117/bjdv11n1-060

[21] Antonio, S. L. (2025). Technological innovations and geomechanical challenges in Midland Basin Drilling. *Brazilian Journal of Development*, *11*(3), e78097. https://doi.org/10.34117/bjdv11n3-005

[22] Moreira, C. A. (2025). Digital monitoring of heavy equipment: advancing cost optimization and operational efficiency. *Brazilian Journal of Development*, *11*(2), e77294. https://doi.org/10.34117/bjdv11n2-011

[23] Delci, C. A. M. (2025). THE EFFECTIVENESS OF LAST PLANNER SYSTEM (LPS) IN INFRASTRUCTURE PROJECT MANAGEMENT. *Revista Sistemática*, *15*(2), 133–139. https://doi.org/10.56238/rcsv15n2-009

[24] SANTOS,Hugo;PESSOA,EliomarGotardi.Impactsofdigitalizationontheefficiencyandqualityofpublicservices:Acomprehensiveanalysis.LUMENETVIRTUS,[S.l.],v.15,n.40,p.44094414,2024.DOI:10.56238/levv15n40024.Disponívelem:https://periodicos.newsciencepubl.com/LEV/article/view/452.Acessoem:25jan.2025.

[25] Freitas,G.B.,Rabelo,E.M.,&Pessoa,E.G.(2023). Projetomodularcomreaproveitamentodecontainermaritimo.BrazilianJournalofDevelopment,9(10),28303–28339.https://doi.org/10.34117/bjdv9n10057

[26] Freitas,G.B.,Rabelo,E.M.,&Pessoa,E.G.(2023). Projetomodularcomreaproveitamentodecontainermaritimo.BrazilianJournalofDevelopment,9(10),28303–28339.https://doi.org/10.34117/bjdv9n10057

[27] Pessoa,E.G.,Feitosa,L.M.,ePadua,V.P.,&Pereira,A.G.(2023).Estudodosrecalquesprimáriosemumaterroexecutadosobreaargilamoledo Sarapuí.BrazilianJournalofDevelopment,9(10),28352–28375.https://doi.org/10.34117/bjdv9n10059

[28] PESSOA,E.G.;FEITOSA,L.M.;PEREIRA,A.G.;EPADUA,V.P.Efeitosdeespéciesdealnaeficiênciadecoagulação,Alresidualepropriedadedosflocosnotratamentodeáguassuperficiais.BrazilianJournalofHealthReview,[S.l.],v.6,n.5,p.2481424826,2023.DOI:10.34119/bjhrv6n5523.Disponívelem:https://ojs.brazilianjournals.com.br/ojs/index.php/BJHR/article/view/63890.Acessoem:25jan.2025.

[29] SANTOS,Hugo;PESSOA,EliomarGotardi.ImpactsofdigitalizationontheefficiencyandqualityofpublicservicesAcomprehensiveanalysis.LUMENETVIRTUS,[S.l.],v.15,n.40,p.44094414,2024.DOI:10.56238/levv15n40024.Disponívelem:https://periodicos.newsciencepubl.com/LEV/article/view/452.Acessoem:25jan.2025.

[30] Filho, W. L. R. (2025). The Role of Zero Trust Architecture in Modern Cybersecurity: Integration with IAM and Emerging Technologies. *Brazilian Journal of Development*, *11*(1), e76836. https://doi.org/10.34117/bjdv11n1-060

[31] Oliveira, C. E. C. de. (2025). Gentrification, urban revitalization, and social equity: challenges and solutions. *Brazilian Journal of Development*, *11*(2), e77293. https://doi.org/10.34117/bjdv11n2-010

[32] Pessoa, E. G. (2024). Pavimentos permeáveis uma solução sustentável. *Revista Sistemática*, *14*(3), 594–599. https://doi.org/10.56238/rcsv14n3-012

[33] Filho, W. L. R. (2025). THE ROLE OF AI IN ENHANCING IDENTITY AND ACCESS MANAGEMENT SYSTEMS. *International Seven Journal of Multidisciplinary*, *1*(2). https://doi.org/10.56238/isevmjv1n2-011

[34] Antonio, S. L. (2025). Technological innovations and geomechanical challenges in Midland Basin Drilling. Brazilian Journal of Development, 11(3), e78097. https://doi.org/10.34117/bjdv11n3-005

[35] Pessoa, E. G. (2024). Pavimentos permeáveis uma solução sustentável. *Revista Sistemática*, *14*(3), 594–599. https://doi.org/10.56238/rcsv14n3-012

[36] Pessoa, E. G. (2024). Pavimentos permeáveis uma solução sustentável. *Revista Sistemática*, *14*(3), 594–599. https://doi.org/10.56238/rcsv14n3-012

[37] Eliomar Gotardi Pessoa, & Coautora: Glaucia Brandão Freitas. (2022). ANÁLISE DE CUSTO DE PAVIMENTOS PERMEÁVEIS EM BLOCO DE CONCRETO UTILIZANDO BIM (BUILDING INFORMATION MODELING). Revistaft, 26(111), 86. https://doi.org/10.5281/zenodo.10022486

[38] Eliomar Gotardi Pessoa, Gabriel Seixas Pinto Azevedo Benittez, Nathalia Pizzol de Oliveira, &

Vitor Borges Ferreira Leite. (2022). ANÁLISE COMPARATIVA ENTRE RESULTADOS EXPERIMENTAIS E TEÓRICOS DE UMA ESTACA COM CARGA HORIZONTAL APLICADA NO TOPO. Revistaft, 27(119), 67. https://doi.org/10.5281/zenodo.7626667

[39] Eliomar Gotardi Pessoa, & Coautora: Glaucia Brandão Freitas. (2022). ANÁLISE COMPARATIVA ENTRE RESULTADOS TEÓRICOS DA DEFLEXÃO DE UMA LAJE PLANA COM CARGA DISTRIBUÍDA PELO MÉTODO DE EQUAÇÃO DE DIFERENCIAL DE LAGRANGE POR SÉRIE DE FOURIER DUPLA E MODELAGEM NUMÉRICA PELO SOFTWARE SAP2000. Revistaft, 26(111), 43. https://doi.org/10.5281/zenodo.10019943

[40] Pessoa, E. G. (2025). Optimizing helical pile foundations: a comprehensive study on displaced soil volume and group behavior. *Brazilian Journal of Development*, *11*(4), e79278. https://doi.org/10.34117/bjdv11n4-047

[41] Pessoa, E. G. (2025). Utilizing recycled construction and demolition waste in permeable pavements for sustainable urban infrastructure. *Brazilian Journal of Development*, *11*(4), e79277. https://doi.org/10.34117/bjdv11n4-046

[42] Testoni, F. O. (2025). Niche accounting firms and the brazilian immigrant community in the U.S.: a study of cultural specialization and inclusive growth. *Brazilian Journal of Development*, *11*(5), e79627. https://doi.org/10.34117/bjdv11n5-034

[43] Silva, J. F. (2025). Desafios e barreiras jurídicas para o acesso à inclusão de crianças autistas em ambientes educacionais e comerciais. *Brazilian Journal of Development*, *11*(5), e79489. https://doi.org/10.34117/bjdv11n5-011