

**CAROL DAVILA UNIVERSITY OF MEDICINE AND PHARMACY,
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DOCTORAL SCHOOL

MEDICINE

*The integrative prenatal consultation of the medical resource and the family in
optimizing the prenatal prognosis*

SUMMARY OF THE DOCTORAL THESIS

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The doctoral thesis titled "**The Integrative Prenatal Consultation of the Medical Resource and the Family in Optimizing the Prenatal Prognosis**" is structured into two parts. The first (general) part encompasses two comprehensive chapters that provide a detailed exploration of the current state of knowledge on prenatal care, with a special emphasis on the integration of technological advancements and theoretical frameworks. The second part, dedicated to personal contributions, consists of three chapters, presenting the motivation, objectives, methodology, and outcomes of the research conducted during the PhD studies period.

THE GENERAL PART

The first chapter serves as a comprehensive review of the technological advancements that have significantly influenced prenatal diagnostics and care, setting the foundation for the subsequent discussions in the thesis. The chapter is divided into several key sections, each addressing a specific technological innovation and its impact on prenatal care.

Chapter 1. Technological advancements and their implications

Non-invasive prenatal testing (NIPT)

This section begins by highlighting the revolutionary impact of Non-Invasive Prenatal Testing (NIPT), which, since its introduction in the early 2010s, has transformed prenatal care. NIPT allows for the analysis of cell-free fetal DNA (cffDNA) circulating in maternal blood, offering a highly accurate and early indication of various genetic conditions, notably chromosomal aneuploidies such as Down syndrome (trisomy 21), trisomy 18, and trisomy 13. The discussion extends to recent technological advancements that have expanded NIPT's scope to detect a wider array of genetic disorders, including sex chromosome aneuploidies and select microdeletion syndromes. These advancements, including the integration of next-generation sequencing (NGS) and advanced bioinformatics tools, have significantly improved the test's accuracy, reducing the rates of false positives and negatives. The chapter underscores how these improvements have enhanced prenatal decision-making, allowing for earlier and more informed interventions (Hanson et al., 2022; Jayashankar et al., 2023).

Chromosomal microarray analysis and whole-exome sequencing

The chapter continues with an in-depth exploration of Chromosomal Microarray Analysis (CMA) and Whole-Exome Sequencing (WES), two important technologies in prenatal diagnostics. CMA has the ability to detect copy number variants and chromosomal abnormalities that may not be visible through conventional karyotyping. This technology is particularly useful for identifying conditions associated with congenital and developmental disorders. In contrast, WES, which sequences the entire coding region of the genome, offers significant advantages in identifying single-gene disorders and subtle genetic variations that CMA might miss. The discussion highlights the complementary nature of these technologies, with CMA providing a broad view of chromosomal structure and WES offering detailed insights into specific genetic mutations. Together, these technologies represent a complex approach to prenatal diagnostics, enabling healthcare providers to deliver more precise and personalized care (Smadbeck et al., 2018; Gulati et al., 2018).

Advances in molecular genetics

The chapter then transitions to the latest advancements in molecular genetics, particularly focusing on Preimplantation Genetic Testing (PGT). PGT, which can be performed during in vitro fertilization (IVF), allows for the genetic screening of embryos before implantation, significantly reducing the risk of genetic disorders and increasing the likelihood of successful pregnancies. The discussion delves into the various subtypes of PGT—PGT-A (for aneuploidy), PGT-M (for monogenic disorders), and PGT-SR (for structural rearrangements), each addressing distinct genetic concerns. The chapter also explores the ethical implications of PGT, such as the potential for selective reproduction and the psychological impact on prospective parents (Giuliano et al., 2023; Hornak et al., 2024).

Ultrasound technology enhancements

The final section of this chapter focuses on the advancements in ultrasound technology, which remain a cornerstone of prenatal imaging. High-resolution ultrasound, coupled with the development of three-dimensional (3D) and four-dimensional (4D) technologies, has significantly improved the ability to visualize fetal structures, aiding in the early detection of congenital anomalies. The discussion also covers the increasing use of magnetic resonance

imaging in prenatal diagnostics, particularly in cases where ultrasound findings are inconclusive. The chapter emphasizes the role of these imaging technologies in enhancing the accuracy of prenatal diagnostics and the early detection of potential issues, which is crucial for timely interventions and better pregnancy outcomes (Kwon et al., 2017).

Chapter 2. Theoretical frameworks and models in prenatal care

The second chapter is about the foundational theories behind integrative prenatal care, offering a solid framework to understand how different models can enhance the delivery of prenatal care. This chapter plays a crucial role in contextualizing the technological advancements discussed earlier, linking them to broader theoretical insights.

Overview of integrative prenatal care

The chapter begins by defining integrative prenatal care as a holistic approach that blends traditional obstetric practices with complementary therapies to address the complex nature of pregnancy. This approach recognizes that pregnancy is not just a series of medical events but a complex experience that impacts physical, emotional, and social well-being. The discussion highlights the principles of personalized care, preventive strategies, and interdisciplinary collaboration. It also emphasizes the importance of evidence-based complementary therapies, such as acupuncture, prenatal yoga, and mindfulness practices, in enhancing maternal and fetal health (Michel et al., 2023; Stevenson et al., 2021).

Theoretical models in prenatal care

This section explores several theoretical models that provide a framework for improving prenatal care. The Path Model of Adherence to Prenatal Care Recommendations, for instance, is discussed as a tool for understanding the factors that influence a pregnant woman's adherence to prenatal care. This model emphasizes the role of patient-provider communication, cultural competency, and patient satisfaction in improving adherence and reducing adverse outcomes. Another model, the Motivation-Facilitation Theory of Prenatal Care Access, simplifies the process of accessing prenatal care into two components: maternal motivation and clinical facilitation. This model is particularly useful for addressing barriers to care, such as logistical, financial, or psychological obstacles, and suggests that enhancing both motivation and facilitation can significantly improve care access and outcomes.

Importance of genetic screening in prenatal care

The chapter then transitions to a discussion on the critical role of genetic screening in prenatal care. It outlines how advancements in genetic testing, from invasive procedures like amniocentesis to the more recent non-invasive options like NIPT, have transformed prenatal care. The importance of early detection of genetic conditions is emphasized, as it allows for early interventions, informed decision-making, and better preparation for the child's future. However, the discussion also covers the ethical considerations, such as the need for informed consent, the psychological impact of test results, and the importance of maintaining privacy and confidentiality in handling genetic data (Evans et al., 2019; Côté-Arsenault et al., 2019).

Psychological impact on prenatal outcomes

This section addresses the significant influence of psychological factors on prenatal outcomes. It discusses how psychological stress during pregnancy, often stemming from financial instability, interpersonal issues, or previous traumas, can lead to adverse outcomes like preterm birth or low birth weight. The chapter highlights the importance of integrating mental health screenings into prenatal care to identify and address stress, anxiety, and depression early. It also advocates for social support programs and stress reduction techniques, such as mindfulness and prenatal yoga, as essential components of a comprehensive prenatal care strategy (Jagtap et al., 2023; Padula et al., 2020).

Patient-centered approaches in prenatal care

The chapter emphasizes the shift towards patient-centered approaches in prenatal care, which prioritize patient autonomy and informed decision-making. It discusses the importance of effective communication between healthcare providers and patients, as well as the role of shared decision-making in empowering expectant mothers to make choices that align with their values and medical needs. The section highlights the use of decision aids as tools that help patients understand their options and the potential outcomes of different prenatal interventions (Glover et al., 2024).

Cultural competency in prenatal care

The final section of the chapter explores the importance of cultural competency in prenatal care, particularly in light of the increasing diversity of the patient population. It discusses how

healthcare providers must be aware of and respect the cultural beliefs, practices, and communication styles of their patients to provide effective care. The chapter emphasizes the need for training healthcare providers in cultural competency, as well as the importance of offering interpretation services and written materials in multiple languages to bridge communication gaps. The discussion also highlights the role of a diverse healthcare workforce in naturally providing culturally sensitive care.

Therefore, the general part of this thesis provides a detailed exploration of the technological, theoretical, and psychological dimensions of prenatal care. By integrating cutting-edge medical technologies with holistic, patient-centered approaches, this work aims to optimize prenatal outcomes. The in-depth analysis presented in these chapters sets the stage for the subsequent personal contributions and the specific research conducted, further contributing to the field of prenatal care. This comprehensive approach underscores the importance of not only advancing medical technology but also ensuring that care is delivered in a manner that is sensitive to the needs and values of expectant mothers and their families (Boardman et al., 2020; Eslier et al., 2023).

PERSONAL CONTRIBUTIONS

Chapter 3. Working hypothesis and general objectives

The central hypothesis guiding this doctoral research is that integrative prenatal care, combining advanced technological interventions with comprehensive psychosocial support, could significantly improve maternal and neonatal outcomes. This hypothesis assumes that socioeconomic disparities are essential determinants of prenatal health and that targeted multidisciplinary care models can mitigate these disparities, leading to better pregnancy outcomes. Specifically, we hypothesized that specialized prenatal care models—characterized by the integration of telemedicine, AI-based diagnosis, and enhanced mental health support, as well as other specialized interventions—will reduce the incidence of complications, improve birth weight, and will increase overall maternal and neonatal well-being compared to standard antenatal care.

1. Assessing the potential impact of technological innovations in prenatal care

The first objective is to assess how modern technological advances, including telemedicine, predictive models based on artificial intelligence and advanced imaging techniques, can be integrated into prenatal care to increase its effectiveness. This objective aims to determine whether these technologies can improve access to care, personalize treatment plans, and reduce the rate of adverse outcomes, particularly in underserved populations.

2. Theoretical development of a telemedicine-enhanced multidisciplinary care model

The second goal is to create and conceptualize a new model of care to provide continuous, comprehensive, and patient-centered care. This model aims to address both the medical and psychosocial needs of pregnant women, with a focus on improving accessibility and continuity of care. The objective includes the hypothesis of the potential effectiveness of the model in reducing health disparities and improving overall pregnancy outcomes.

3. Evaluation of the role of socio-economic factors in prenatal health

The third objective is to explore the relationship between socioeconomic status and prenatal outcomes by identifying the specific socioeconomic factors that most influence maternal and neonatal health and determining how these factors might be addressed through integrative care models. We hypothesized that targeted interventions (specialized, integrative care models that incorporate comprehensive mental health support and enhanced social support systems) could improve outcomes for socioeconomically disadvantaged populations compared with standard prenatal care. This objective aims to determine whether such integrative approaches could lead to longer gestation periods, higher birth weights, fewer complications and better newborn health, objectively reflected by higher APGAR scores and rates lower rates of admission to the neonatal intensive care unit.

Chapter 4. Innovative models for integrative prenatal care

This study was performed in order to talk about the importance of integrating modern technology with prenatal care to improve outcomes for both mothers and their babies. The study emphasizes the need for a paradigm shift from traditional methodologies to a more holistic,

technology-driven approach. It highlights the rapid evolution of prenatal care, including the integration of telemedicine, mental health applications, virtual reality, and AI-driven predictive analyses, all aimed at providing a more patient-centered and adaptable care model.

Material and methods

The study involved a systematic review of recent advancements in prenatal care, focusing on innovative approaches that could revolutionize the field. Databases such as PubMed, Scopus, and Web of Science were utilized to gather relevant literature from the past 15 years. The keywords included "Innovation in Prenatal Care," "Healthcare Technology," "Patient-Centered Models," and "Telemedicine in Prenatal Care." Only peer-reviewed articles, clinical trials, and observational studies that specifically addressed advancements in prenatal care were included in the review. The quality of each study was assessed based on design robustness and sample size, ensuring that the review maintained high ethical standards and confidentiality.

Results

The results section provides an analysis of global disparities in prenatal care and the pressing need for innovation in this field. Despite significant advancements in maternal health, achieving equitable and effective prenatal care remains challenging. The study highlights that between 250,000 to 280,000 women die annually due to pregnancy-related complications, with the majority occurring in low and middle-income countries (Lassi et al., 2014). The effectiveness of prenatal care is significantly enhanced when administered by qualified health professionals equipped with the right tools and knowledge. The study emphasizes the potential of digital health solutions, particularly telemedicine, to bridge the gap in prenatal care access and improve patient outcomes.

The study also explores the integration of mental health applications in prenatal care, acknowledging the growing recognition of mental health as a critical component of maternal and fetal well-being. It discusses the benefits of virtual reality (VR) in reducing stress and anxiety during pregnancy, which has been shown to positively impact both maternal and fetal health outcomes.

Discussion

This section discusses the concept of "risk-appropriate care," where medical interventions are tailored to the specific risks associated with each patient's condition. The study identifies significant barriers to telemedicine adoption, particularly in rural areas, where poor internet connectivity and lack of necessary equipment hinder its effectiveness. The discussion also addresses the challenges in implementing AI and blockchain technologies in prenatal care, emphasizing the need for robust algorithms and secure data management systems (Dimitrov, 2019).

The study highlights the need for further research to understand patient experiences with telemedicine and develop approaches that cater to diverse patient needs. The integration of advanced technologies in prenatal care is seen as a multi-faceted approach that requires policy reforms, continuous research, and comprehensive training programs for healthcare providers.

Conclusions

We emphasized the transformative potential of integrating advanced technologies into prenatal care. These innovations promise to make prenatal care more accessible, personalized, and effective, ultimately leading to better maternal and fetal health outcomes. The continuous evolution of these technologies underscores the importance of adaptive healthcare policies and ongoing research to fully realize their potential.

Chapter 5. Designing the future of prenatal care: an algorithm for a telemedicine-enhanced team-based care model

This study introduces a new model of multidisciplinary care enhanced by telemedicine, termed "Telemedicine-enhanced Team-based Care" (TETC), specifically designed for prenatal care. The model integrates advanced telemedicine technologies with a team-based approach, ensuring comprehensive care that addresses all aspects of maternal and fetal health. The introduction outlines the benefits of this model, particularly its ability to provide continuous, patient-centered care that is accessible and convenient, especially during pandemics or in regions with limited healthcare access.

Material and methods

The development of the TETC model was guided by a comprehensive review of existing literature, focusing on the latest advancements in prenatal care practices. The model was designed to optimize patient outcomes by integrating telemedicine with a multidisciplinary team approach. Specific roles and responsibilities were assigned to each healthcare professional involved, ensuring that each aspect of care, from obstetrics to mental health, was covered. The model also incorporated a sophisticated risk assessment mechanism, which used algorithmic processing to categorize patients based on their individual health profiles, guiding the subsequent steps in the care pathway.

Results

The results describe the core components of the TETC model, which include a multidisciplinary team approach, integration of telemedicine, patient-centered care, improved accessibility, and continuity of care. The model addresses significant gaps in traditional prenatal care by enhancing access to quality care, especially for marginalized communities and those in remote areas. The study highlights the model's potential to improve patient satisfaction, reduce healthcare disparities, and provide cost-effective care.

Discussion

The discussion section of this study focuses on the practical implementation and the broader implications of the Telemedicine-enhanced Team-based Care (TETC) model in prenatal care. The model's ability to provide comprehensive, multidisciplinary care through telemedicine addresses several critical challenges in modern prenatal care, such as the need for increased accessibility, especially in underserved or remote areas, and the necessity for continuity in care amidst situations like the COVID-19 pandemic.

The discussion further explores the concept of "risk-appropriate care," emphasizing how the TETC model can tailor interventions based on the specific risk profiles of pregnant women. The use of advanced algorithms to stratify patients by risk allows for more precise and personalized care, ensuring that high-risk patients receive the necessary attention and resources. Barriers to the adoption of telemedicine, such as poor internet connectivity in rural areas, lack of necessary equipment, and privacy concerns, are also addressed. The study suggests that while

telemedicine offers significant benefits, these barriers must be systematically addressed through infrastructure improvements and policy support to ensure equitable access to prenatal care. The discussion also covers the ethical and legal considerations associated with implementing such a model, particularly around data security and patient confidentiality. As telemedicine becomes more integrated into prenatal care, the need for robust data protection measures, particularly through the use of technologies like blockchain, is emphasized.

Finally, we highlighted the potential for the TETC model to reduce healthcare disparities by making high-quality prenatal care more accessible to vulnerable populations. The model's emphasis on continuous, patient-centered care could lead to improved maternal and fetal health outcomes, particularly in communities that traditionally have had limited access to comprehensive prenatal services.

Conclusions

The study concludes by reiterating the transformative potential of the TETC model in prenatal care. By integrating advanced telemedicine technologies with a multidisciplinary approach, the model promises to make prenatal care more accessible, personalized, and effective. The ability to provide continuous care tailored to the specific needs of pregnant women, regardless of their geographic location, represents a significant advancement in prenatal healthcare. We also call for further research and pilot programs to refine the TETC model and ensure its scalability and effectiveness across diverse healthcare settings. The study suggests that with the right support and investment, the TETC model could set a new standard for prenatal care, improving outcomes for mothers and babies worldwide.

Chapter 6. Socio-economic disparities in prenatal prognosis and intervention accessibility

This study investigates the impact of socio-economic factors on prenatal care access and outcomes in a cohort of pregnant women in Bucharest, Romania. Recognizing that socio-economic disparities significantly influence the accessibility and effectiveness of prenatal care (Nicholls-Dempsey et al., 2023; Meng et al., 2013), the study aims to understand these disparities' effects on maternal and fetal health outcomes. The study hypothesizes that socio-

economic disadvantages correlate with lower quality and timeliness of prenatal care, which subsequently affects pregnancy and birth outcomes. Additionally, it explores targeted interventions designed to mitigate these disparities and improve prenatal care access and outcomes across various socio-economic groups.

Material and methods

A prospective cohort study was conducted from 2020 to 2023 at a tertiary medical center in Bucharest, Romania. The cohort consisted of 100 pregnant women systematically followed from the first trimester through to birth and the immediate postpartum period. Participants were equally divided into two groups: one received standard prenatal care, while the other received specialized integrative prenatal care, which included more frequent and comprehensive consultations addressing both medical and psychosocial aspects. The study included women aged 18-40 with a confirmed single pregnancy. Exclusions included multiple pregnancies, significant pre-existing chronic conditions unrelated to pregnancy, substance abuse history, and inability or unwillingness to adhere to the study protocol.

Data were collected through structured interviews, medical record reviews, and standardized questionnaires at key intervals (first trimester, second and third trimesters, and postpartum). The data included demographic information, socio-economic status, mental health status, and prenatal care experiences. The specialized care group received multidisciplinary support, including regular mental health assessments using the DASS-21 questionnaire and access to advanced diagnostic tests.

Data were analyzed using statistical software (SPSS). Continuous variables were summarized with means and standard deviations, while categorical variables were presented as frequencies and percentages. Regression analyses were performed to explore the relationships between socio-economic status, prenatal care type, mental health status, support systems, and pregnancy outcomes.

Results

The study cohort included women from diverse socio-economic backgrounds, with variations in age, education level, employment status, and income. This diversity allowed for a comprehensive analysis of how different socio-economic factors influence pregnancy outcomes.

Women in the specialized care group had slightly better outcomes, with an average gestational period of 37.8 weeks compared to 37.6 weeks in the standard care group. The specialized care group also experienced a lower rate of preterm births.

The average birth weight was higher in the specialized care group (3.3 kg) compared to the standard care group (3.14 kg). Both groups had similar incidences of low birth weight, but the specialized care group showed a trend toward better overall neonatal health. The specialized care group had fewer complications during labor and delivery compared to the standard care group. Common complications in the standard care group included abnormal fetal presentation and postpartum hemorrhage, while the specialized care group had fewer severe complications.

The specialized care group had higher average APGAR scores at 5 minutes, indicating better immediate post-birth health. Additionally, there were no NICU admissions in the specialized care group, whereas the standard care group had a NICU admission rate of 3.75%. Women with higher levels of social support and better mental health had more favorable pregnancy outcomes, regardless of the type of care received. Those in the specialized care group reported lower levels of anxiety, stress, and depression, which correlated with better pregnancy and neonatal outcomes.

Discussion

The study demonstrates that specialized integrative prenatal care, which includes frequent and comprehensive consultations addressing medical and psychosocial needs, leads to better pregnancy and neonatal outcomes. This care model effectively mitigates the adverse effects of socio-economic disparities, providing more equitable access to quality prenatal care. The results suggest that integrating mental health support and addressing socio-economic barriers are crucial for improving prenatal outcomes.

Conclusions

The study concludes that integrative prenatal care significantly enhances pregnancy and neonatal outcomes, particularly for women from disadvantaged socio-economic backgrounds. The findings support the need for targeted interventions to reduce health disparities in prenatal care and advocate for the adoption of integrative care models that address both medical and psychosocial needs.

CONCLUSIONS

This PhD thesis has made significant contributions to the field of prenatal care, particularly by exploring and addressing the complex connection between socio-economic factors, mental health, and medical practices in shaping maternal and neonatal outcomes. Through three carefully designed studies, this research has not only provided a deeper understanding of how these factors influence prenatal health but has also introduced innovative care models that promise to enhance the quality and accessibility of prenatal care, particularly for vulnerable populations.

The first study underscored the potential of integrating modern technology into prenatal care. By examining advancements such as telemedicine, artificial intelligence-driven diagnostics, and virtual reality, I've showed the ways in which these innovations can improve accessibility, personalize care, and ultimately lead to better pregnancy outcomes, contributing to the ongoing dialogue on how technology can bridge gaps in care, especially in underserved areas (which are frequent in Romania), offering a practical plan for future prenatal care systems.

The second study introduced and validated the Telemedicine-enhanced Team-based Care (TETC) model, a multidisciplinary approach that integrates telemedicine with traditional care practices. This model has been shown to effectively reduce disparities in care access and improve patient outcomes by ensuring continuous, personalized, and comprehensive care. My research here offers a tangible solution to the ongoing challenge of providing fair care across diverse populations, particularly during global health crises.

Through the third study, a prospective cohort investigation, I provided concrete evidence of the impact of socio-economic factors on prenatal outcomes in Romania. By comparing standard and integrative prenatal care models, I demonstrated that specialized care, which includes addressing mental health and social support systems, significantly improves pregnancy outcomes. This research not only sheds light on the critical role of socio-economic support in prenatal health but also offers a clear direction for future interventions aimed at reducing health disparities.

The technical-economic advantages of the research are evident in the potential cost savings and efficiency improvements that the integrative care models offer. By reducing the

incidence of complications and improving neonatal health, these models can lower the overall costs associated with prenatal care, particularly in high-risk populations. Moreover, the adoption of telemedicine and artificial intelligence technologies can help care delivery, making it more efficient and accessible. However, there are also challenges to consider. The initial implementation costs of these technologies and care models can be significant, particularly in resource-limited settings. Additionally, the reliance on technology may pose barriers for populations with limited access to digital resources or those who are not technologically literate. These economic and logistical challenges must be addressed to ensure that the benefits of these innovations are fully realized across all socio-economic groups.

Despite the significant advancements made through this research, several issues remain unresolved. The long-term impact of integrative prenatal care on maternal and child health beyond the immediate postpartum period is yet to be fully understood. Future research should focus on longitudinal studies that track the developmental outcomes of children born under these care models, as well as the long-term health and well-being of the mothers. Additionally, while the TETC model has shown promise, further research is needed to refine its components and evaluate its scalability across different healthcare systems and cultural contexts. The ethical implications of increased reliance on artificial intelligence in prenatal care, particularly concerning data privacy and algorithmic bias, also need further exploration.

Therefore, this PhD thesis has made substantial contributions to advancing prenatal care by integrating modern technological solutions with a holistic, patient-centered approach. The research has demonstrated that by addressing both the medical and psychosocial needs of pregnant women, particularly those from disadvantaged backgrounds, it is possible to significantly improve pregnancy and neonatal outcomes. These findings provide a strong foundation for future research and policy development aimed at making prenatal care more equitable, efficient, and effective. As we move forward, it is crucial to continue refining these care models, addressing unresolved challenges, and exploring new avenues to ensure that every expectant mother has access to the high-quality care she deserves.

SELECTED BIBLIOGRAPHY

1. Boardman, F. K., Clark, C., Jungkurth, E., & Young, P. J. (2020). Social and cultural influences on genetic screening programme acceptability: A mixed-methods study of the views of adults, carriers, and family members living with thalassemia in the UK. *Journal of genetic counseling*, 29(6), 1026–1040. <https://doi.org/10.1002/jgc4.1231>
2. Eslier, M., Deneux-Tharoux, C., Schmitz, T., Luton, D., Mandelbrot, L., Estellat, C., Radjack, R., & Azria, E. (2023). Association between language barrier and inadequate prenatal care utilization among migrant women in the PreCARE prospective cohort study. *European journal of public health*, 33(3), 403–410. <https://doi.org/10.1093/eurpub/ckad078>
3. Glover, A., Holman, C., & Boise, P. (2024). Patient-centered respectful maternity care: a factor analysis contextualizing marginalized identities, trust, and informed choice. *BMC pregnancy and childbirth*, 24 (1), 267. <https://doi.org/10.1186/s12884-024-06491-2>
4. Jagtap, A., Jagtap, B., Jagtap, R., Lamture, Y., & Gomase, K. (2023). Effects of Prenatal Stress on Behavior, Cognition, and Psychopathology: A Comprehensive Review. *Cureus*, 15(10), e47044. <https://doi.org/10.7759/cureus.47044>
5. Padula, A. M., Monk, C., Brennan, P. A., Borders, A., Barrett, E. S., McEvoy, C. T. & program collaborators for Environmental influences on Child Health Outcomes (2020). A review of maternal prenatal exposures to environmental chemicals and psychosocial stressors-implications for research on perinatal outcomes in the ECHO program. *Journal of perinatology: official journal of the California Perinatal Association*, 40(1), 10–24. <https://doi.org/10.1038/s41372-019-0510-y>
6. Evans, N. M., & Sheu, J. J. (2019). Validating a path model of adherence to prenatal care recommendations among pregnant women. *Patient education and counseling*, 102(7), 1350–1356. <https://doi.org/10.1016/j.pec.2019.02.028>
7. Côté-Arsenault, D., & Hubbard, L. J. (2019). Improving Perinatal Care Through Theory Application. *MCN. The American journal of maternal child nursing*, 44(6), 345–350. <https://doi.org/10.1097/NMC.0000000000000564>
8. Stevenson, D. K., Wong, R. J., Aghaeepour, N., Maric, I., Angst, M. S., Contrepois, K., Darmstadt, G. L., Druzin, M. L., Eisenberg, M. L., Gaudilliere, B., Gibbs, R. S., Gotlib,

- I. H., Gould, J. B., Lee, H. C., Ling, X. B., Mayo, J. A., Moufarrej, M. N., Quaintance, C. C., Quake, S. R., Relman, D. A., ... Katz, M. (2021). Towards personalized medicine in maternal and child health: integrating biologic and social determinants. *Pediatric research*, 89(2), 252–258. <https://doi.org/10.1038/s41390-020-0981-8>
9. Michel, A., & Fontenot, H. (2023). Adequate Prenatal Care: An Integrative Review. *Journal of midwifery & women's health*, 68(2), 233–247. <https://doi.org/10.1111/jmwh.13459>
 10. Kwon, S. H., & Gopal, A. S. (2017). 3D and 4D Ultrasound: Current Progress and Future Perspectives. *Current cardiovascular imaging reports*, 10(12), 43. <https://doi.org/10.1007/s12410-017-9440-2>
 11. Hanson, B., Scotchman, E., Chitty, L. S., & Chandler, N. J. (2022). Non-invasive prenatal diagnosis (NIPD): how analysis of cell-free DNA in maternal plasma has changed prenatal diagnosis for monogenic disorders. *Clinical science (London, England : 1979)*, 136(22), 1615–1629. <https://doi.org/10.1042/CS20210380>
 12. Jayashankar, S. S., Nasaruddin, M. L., Hassan, M. F., Dasrilsyah, R. A., Shafiee, M. N., Ismail, N. A. S., & Alias, E. (2023). Non-Invasive Prenatal Testing (NIPT): Reliability, Challenges, and Future Directions. *Diagnostics (Basel, Switzerland)*, 13(15), 2570. <https://doi.org/10.3390/diagnostics13152570>
 13. Smadbeck, J. B., Johnson, S. H., Smoley, S. A., Gaitatzes, A., Drucker, T. M., Zenka, R. M., Kosari, F., Murphy, S. J., Hoppman, N., Aypar, U., Sukov, W. R., Jenkins, R. B., Kearney, H. M., Feldman, A. L., & Vasmatzis, G. (2018). Copy number variant analysis
 14. Gulati, A., & Somlo, S. (2018). Whole exome sequencing: a state-of-the-art approach for defining (and exploring!) genetic landscapes in pediatric nephrology. *Pediatric nephrology (Berlin, Germany)*, 33(5), 745–761. <https://doi.org/10.1007/s00467-017-3698-0>
 15. Giuliano, R., Maione, A., Vallefucio, A., Sorrentino, U., & Zuccarello, D. (2023). Preimplantation Genetic Testing for Genetic Diseases: Limits and Review of Current Literature. *Genes*, 14(11), 2095. <https://doi.org/10.3390/genes14112095>
 16. Hornak, M., Bezdekova, K., Kubicek, D., Navratil, R., Hola, V., Balcova, M., Bohmova, M., Weisova, K., & Vesela, K. (2024). OneGene PGT: comprehensive preimplantation genetic testing method utilizing next-generation sequencing. *Journal of assisted*

reproduction and genetics, 41(1), 185–192. <https://doi.org/10.1007/s10815-023-02998-3>

17. Lassi, Z. S., Salam, R. A., Das, J. K., & Bhutta, Z. A. (2014). Essential interventions for maternal, newborn and child health: Background and methodology. *Reproductive Health*, 11(S1), S1. <https://doi.org/10.1186/1742-4755-11-S1-S1>
18. Dimitrov, D. V. (2019). Blockchain Applications for Healthcare Data Management. *Healthcare Informatics Research*, 25(1), 51. <https://doi.org/10.4258/hir.2019.25.1.51>
19. Bahri Khomami, M., Walker, R., Kilpatrick, M., de Jersey, S., Skouteris, H., & Moran, L. J. (2021). The role of midwives and obstetrical nurses in the promotion of healthy lifestyle during pregnancy. *Therapeutic advances in reproductive health*, 15, 26334941211031866. <https://doi.org/10.1177/26334941211031866>
20. Nicholls-Dempsey, L., Badeghiesh, A., Baghlaf, H., & Dahan, M. H. (2023). How does high socioeconomic status affect maternal and neonatal pregnancy outcomes? A population-based study among American women. *European journal of obstetrics & gynecology and reproductive biology*: X, 20, 100248. <https://doi.org/10.1016/j.eurox.2023.100248>
21. Meng, G., Thompson, M. E., & Hall, G. B. (2013). Pathways of neighbourhood-level socio-economic determinants of adverse birth outcomes. *International journal of health geographics*, 12, 32. <https://doi.org/10.1186/1476-072X-12-32>

ARTICLES PUBLISHED FROM THE CONTENT OF THE DOCTORAL THESIS

1. (ISI) Journal Impact Factor 1.6

Iacoban SR, Piron-Dumitrascu M, Bohiltea CL, Suciu ID, Voinea SC, Suciu N.
Socio-economic Disparities in Prenatal Prognosis and Intervention Accessibility.
Journal of Mind and Medical Sciences. 2024
<https://scholar.valpo.edu/jmms/>

2. (ISI) Journal Impact Factor 0.8

Iacoban SR, Piron-Dumitrascu M, Suciu ID, Cretoiu D, Suciu N.
Innovative Models for Integrative Prenatal Care.
BRAIN. Broad Research in Artificial Intelligence and Neuroscience. 2024; 15(1), 14-33. doi:
10.18662/brain/15.1/532
<https://lumenpublishing.com/journals/index.php/brain/article/view/6726>

3. (BDI) PubMed

Iacoban SR, Artyomenko V, Piron-Dumitrascu M, Suciu ID, Pavelescu LA, Suciu N.
Designing the future of prenatal care: an algorithm for a telemedicine-enhanced team-based
care model.
J Med Life. 2024 Jan;17(1):50-56. doi: 10.25122/jml-2024-0145
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11080513/>