Maternal and foeto-neonatal characteristics of home childbirth

Doctoral (Ph.D.) dissertation booklet

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1. INTRODUCTION

Home birth has emerged as a contemporary issue, one of the most contentious and hotly disputed topics in modern maternity care. As more pregnant parents look for alternatives to hospital deliveries, the practice of giving birth at home has gained popularity, provoking a variety of responses from healthcare professionals, lawmakers, and the general public. The debate over home birth involves a wide range of concerns, including safety, accessibility, maternal autonomy, and healthcare system dynamics, revealing a complex interaction of medical, social, and cultural considerations. Throughout our findings, speculating the risks, and results connected with home birth is critical to making educated decisions and advancing maternal and neonatal health practices.

Epidemiological overview of homebirth practices

The prevalence of homebirth varies significantly worldwide, influenced by cultural norms, socioeconomic factors, and access to healthcare. In some regions, such as the Netherlands and certain rural areas in developing countries, homebirth is common and culturally accepted, often seen as a feasible option for low-risk pregnancies. In nations like the UK, Canada, and New Zealand, homebirth is moderately practiced, with some women choosing it over hospital deliveries, facilitated by licensed midwives. However, in countries like the United States, Australia, and parts of Europe, homebirth is relatively rare, with most deliveries occurring in medical institutions due to factors such as cultural shifts, the medicalization of childbirth, and the perceived safety of hospital births. These disparities underscore the complex interplay of cultural, social, and healthcare system factors in shaping birthing practices globally.

Integration of homebirth practices into the healthcare system

The concepts of integrated and unintegrated homebirth refer to the level of collaboration between homebirth practices and formal healthcare systems. The distinction between these models is crucial as it impacts the safety and quality of care during homebirth. Integrated homebirth emphasizes smooth transitions of care and acknowledges the inherent risks of homebirth, whereas unintegrated homebirth may entail greater risks due to restricted access to medical interventions. While different countries and healthcare systems vary in their integration of homebirth practices, legal frameworks and regulations are sometimes established to enable integrated models, highlighting the importance of cohesive collaboration between homebirth providers and the formal healthcare system.

Our study also considers the contextual factors for home birth, defined as "well-integrated" as contrasted to "less well-integrated." A “well-integrated setting” is one in which home birth practitioners could provide or arrange hospital care, access an established emergency transport system, carry emergency supplies and equipment, are recognised by statute within their jurisdiction, and have completed formal training.

Settings lacking one or more characteristics are “less well-integrated”. Although some countries in ‘less well-integrated’ settings were well-integrated, the degree of integration varied by regions (Belgium, Spain, Norway, Italy, Iceland, and Lithuania), setting having a completely autonomous or operates independently from healthcare system are “unintegrated/not integrated.”

Factors related to homebirth practices

The choice to give birth at home is impacted by a number of factors that differ among nations, people, cultures, and healthcare systems. I have summarized some typical factors that influence homebirth.

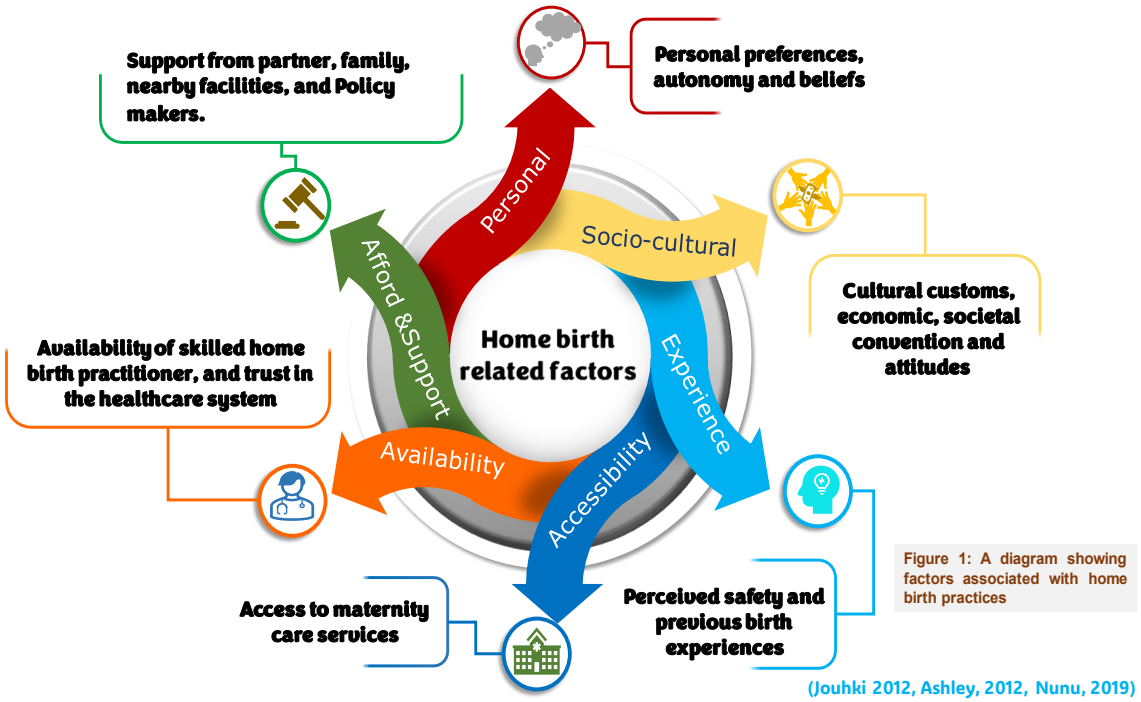


Figure 1: A diagram showing factors associated with home birth practices

Health concerns, adverse outcomes, and safety issues related to homebirth

Homebirth, though considered a safe alternative for low-risk pregnancies when supervised by trained attendants, poses significant health risks and safety concerns. Maternal complications such as postpartum haemorrhage and neonatal issues like asphyxia may require immediate medical attention, which can be delayed in homebirth settings lacking continuous monitoring. Adverse outcomes, including slightly higher newborn mortality rates and perinatal morbidity, underscore the importance of careful consideration and prompt medical intervention. Safety issues arise from potential delays in accessing emergency assistance, limited availability of medical procedures, and inadequate risk assessment, emphasizing the necessity of prioritizing safety and preparedness for timely transfer to a medical facility if needed to ensure the well-being of both mother and newborn.

Problem statement

Expectant parents face the pivotal decision of where to give birth to their newborn, with institutional births in hospitals or birthing centers being the mainstream choice. However,

homebirth is also gaining popularity as an empowering alternative, offering a more personalized experience with fewer interventions and reduced medical risks according to its proponents. Critics, however, raise concerns regarding the readiness and safety of homebirth attendants, as well as potential delays in emergency medical assistance. Recent research suggests that homebirth can indeed be safe and fulfilling for low-risk pregnancies, provided appropriate precautions and guidelines are adhered to, addressing some of the concerns surrounding this practice.

Concerns persist regarding the safety of homebirths compared to hospital births, with worries about possible complications, delays in emergency care, and unfavorable outcomes for both mothers and babies. Additionally, the absence of uniform risk assessment and selection standards for homebirth further complicates the issue. To ensure the safety and well-being of both mother and newborn, it is crucial to carefully evaluate women's suitability for homebirth, considering factors such as medical history and gestational age.

2. RESEARCH OBJECTIVES

Main Objective: To investigate the characteristics of home childbirths in developed and developing countries with distinct background and perspectives with the overarching goal of enhancing the safety of homebirth practices.

Specific Objectives:

- To describe the demographic characteristics of women who choose home childbirth, including age, education level, socioeconomic status, and rural/urban residence.
- To examine the obstetric characteristics of women who opt for home childbirth, including parity, previous birth experiences, and medical history.

- To determine the prevalence of home childbirth in the study population and investigate any temporal trends.
- To assess the maternal outcomes associated with home childbirth, including rates of maternal morbidity, birth experience, and postpartum care.
- To investigate the foeto-neonatal outcomes of home childbirth, including rates of neonatal morbidity, mortality, and birth weight.
- To identify factors associated with successful home childbirth, such as the presence of skilled birth attendants, availability of emergency plans, and access to timely transfer of care in case of complications.
- To compare the safety of home childbirth to hospital births in terms of maternal and foeto-neonatal outcomes.
- To examine potential disparities in the characteristics and outcomes of home childbirth based on geographic location, rural vs. urban areas, or different regions.
- To explore the long-term implications and follow-up care needs for mothers and newborns born through home childbirth.

By addressing these specific objectives, the study aims to provide comprehensive insights into the various aspects of home childbirth, contributing to a better understanding of its outcomes, safety, determinants, and disparities.

3. IN-DEPTH INVESTIGATION

3.1. Effects of planned place of birth on obstetric interventions and foeto-maternal birth outcomes in low-risk women: A systematic review and meta-analysis of European studies:

Background

The birthplace has long been a source of scholarly debate and societal discourse, with varying recommendations over time among low-risk women. This systematic review and meta-analysis try to explore the intricate relationship between birthing place, obstetric interventions, and feto-maternal outcomes in low-risk women in European countries.

Europe has a diverse healthcare landscape, with variations in maternity care practices and policies across countries. Investigating birth outcomes in this context can provide valuable insights into how different healthcare systems and cultural preferences influence the choice of birthplace and its consequences and draw attention to gaps in the current body of literature and open the door for more study endeavours in the field of obstetric care.

Evidence before this study

Childbirth is among the most common reasons for hospitalisation in well-resourced countries; however, the practice of home births is being considered again in several developed, wealthy nations. Barbero and Manrique in 2021 stated that compared to institutional births, where overtreatment may occur, this is predicated on assertions of equal safety at lower intervention rates. Moreover, Kooy, in 2017, also stated that it predicated on the purported decrease in morbidity between mother and fetus as well as hypothesised psycho-social benefits for the mother.

Thus, our study adds to the existing body of knowledge by analysing a comprehensive meta-analysis concerning the planned birthplace by adhering to reputable, published, peer-reviewed studies considering different designs and settings in European countries.

Review questions

◊ Does the choice of planned place of birth impact obstetric interventions and foeto-maternal birth outcomes among low-risk women in European countries?

◊ Do parity and jurisdictional support for integrating home birth into the maternity care system have an association with place of birth and perinatal outcomes?

Methods

We used our registered protocol (PROSPERO CRD42023439378) and searched seven databases including PubMed, Ovid MEDLINE, EMBASE, CINAHL, Cochrane Library, Scopus, and Web of Science.

For inclusion, original studies examining planned birthplace among low-risk women in European countries from 1990 to 2023 were considered, while studies focusing on high-risk or complicated pregnancies, unplanned or emergency births, and those lacking relevant data on obstetric interventions or maternal and fetal outcomes were excluded. In multiple-arm studies where groups were categorized based on provider type, preference was given to midwifery-led care to minimize potential confounding factors.

The risk of bias assessment utilized the latest Cochrane risk-of-bias tool for Randomized Trials (RoB 2) and the New Castle Ottawa Scale (NOS) for observational and non-randomized controlled trials. Publication bias was evaluated using funnel plots. Full-text screening and extraction were conducted using Cochrane software for systematic reviews (COVIDENCE). Meta-analyses were performed using RevMan version 5.4.1, incorporating pooled estimates of effect while considering the level of integration and parity.

Results

A comprehensive search of 2,042 articles yielded 21 studies for a systematic review and 20 studies for a meta-analysis found no maternal deaths among nearly 750,000 women included. With limited evidence, there was no statistically significant variation in perinatal mortality by birthplace (pooled result stratified by parity: OR 1.87, 95%CI [0.74, 4.72], and level of integration: OR 1.05, 95%CI [0.62, 1.79]). Women planning homebirths in well-integrated settings exhibited a 76% of a reduced likelihood of Caesarean section (OR 0.24, 95% CI [0.12,

0.49]), a 29% reduction in assisted vaginal births (OR 0.71, 95% CI [0.56, 0.90]), epidural analgesia by 66% (OR 0.34, 95% CI [0.24, 0.46]), retained placenta by 59% (OR 0.41, 95% CI [0.37 to 0.45]). Conversely, in less well-integrated settings, the likelihood of Caesarean sections surged by 69% (OR 0.69, 95% CI [0.46 to 1.01]), assisted vaginal births increased by 59% (OR 0.59, 95% CI [0.41, 0.85]), and 3rd or 4th degree perineal tear by 63% (OR 0.63, 95% CI [0.41, 0.97]).

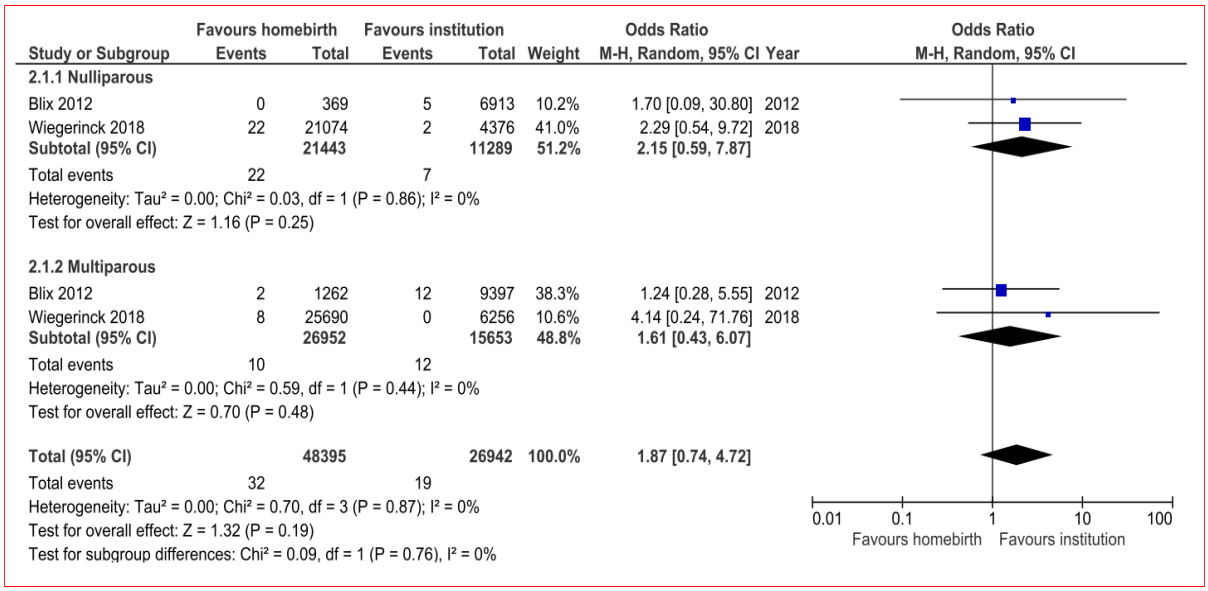


Figure 2: Forest plot of perinatal mortality meta-analysis stratified by parity.

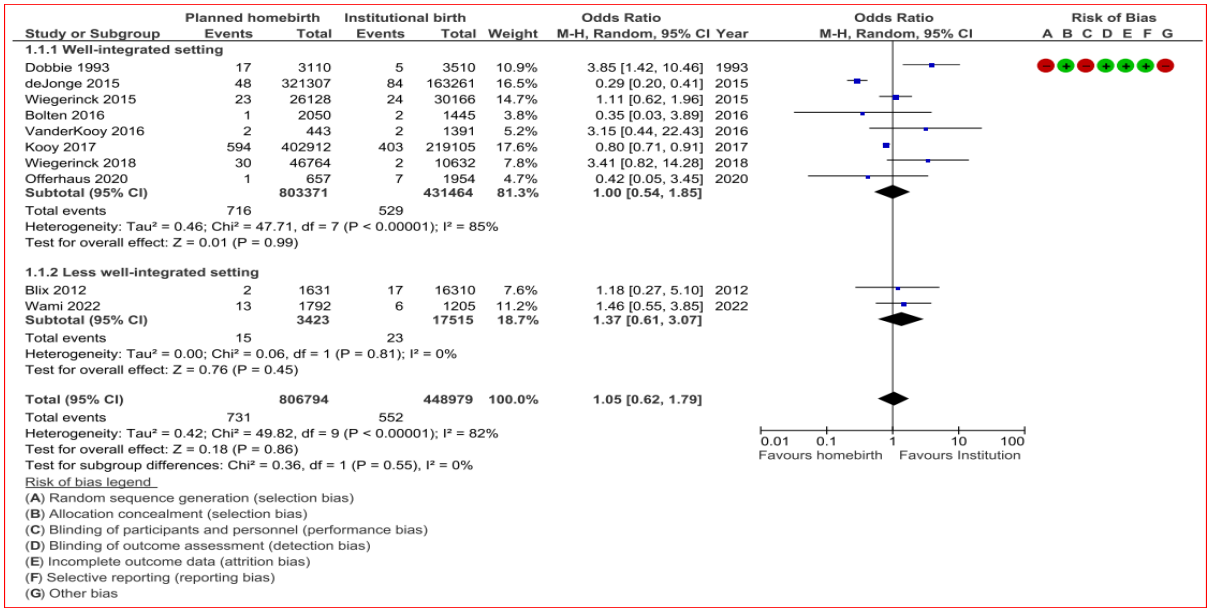
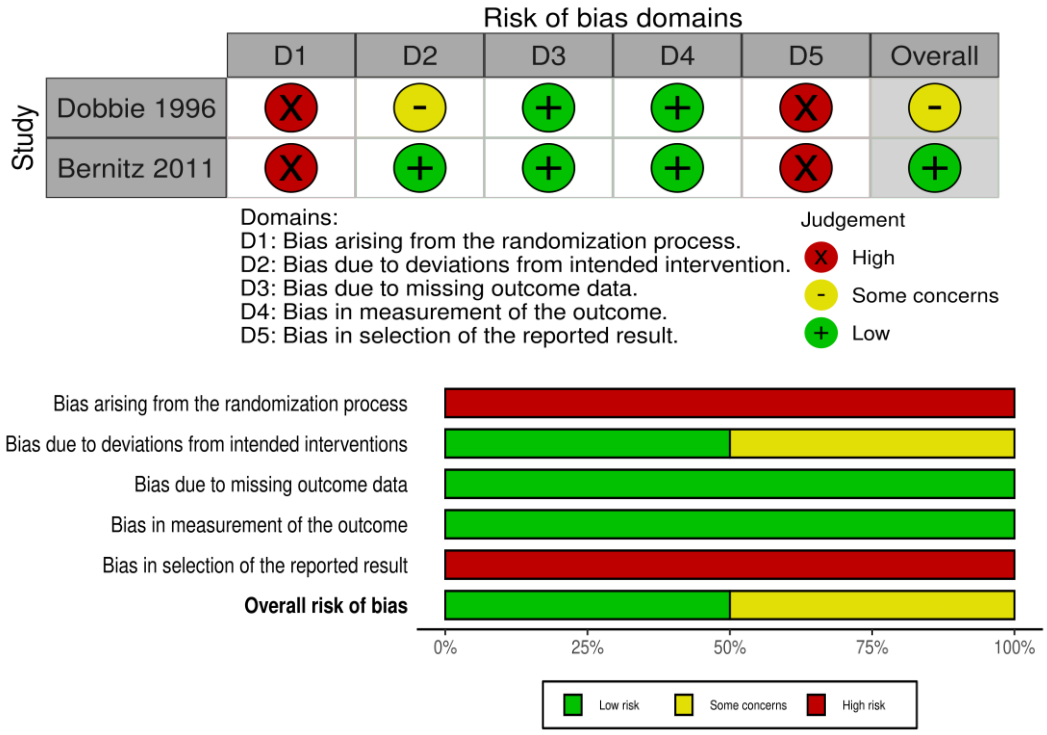


Figure 3: Forest plot of perinatal mortality meta-analysis stratified by the level of midwives' integration into healthcare system after accounting for parity.



Used tool: Robvis visualization tool available at https://www.riskofbias.info/welcome/robvis-visualization-tool

Figure 4: Risk of bias assessment for RCT(RoB2)

Limitations and considerations

Despite the comprehensive nature of our analysis, certain limitations should be acknowledged. As reflected in the I^2 results, the heterogeneity observed across studies introduces a degree of caution in interpreting our findings. The restricted availability of studies, particularly in less well-integrated settings, underscores the need for additional research to enhance the robustness of our conclusions.

Conclusions: The planned place of birth appears to influence the incidence of obstetric interventions among low-risk women in European countries. While perinatal mortality shows no statistically significant variation by parity, the study highlights distinct outcomes in well-integrated compared to less well-integrated settings, emphasising the importance of birthplace in maternity care decision-making. However, cautious interpretation is needed due to the heterogeneity across the studies and the limited evidence for some outcomes. Future studies

should prioritise exploring contextual factors influencing outcomes and further elucidate the complex interplay.

3.2. Characteristics of homebirth in Hungary: A Retrospective Cohort Study

Background

Births can take place either at home or in healthcare institutions in Hungary. Until 2012, home birth was neither legal nor illegal. But as of today, *home birth is legal and regulated by law in Hungary*, however, it has not yet been broadly accepted since only criminal cases were reported in the media before 2012. Our study aimed at exploring both real maternal and foeto-neonatal characteristics associated with Hungarian home births compared with institutional births.

Methods: A total of 2,997 cases were considered in support of our comparative retrospective cohort study. Data regarding home birth cases (n=1792) was sourced from Hungarian Tauffer databases (2012-2020) and compared with its matched institutional birth data (n=1205) obtained from a university linked obstetrical departments. Both descriptive and inferential statistics were conducted sing SPSS version 26.

Since risk selection was less optimal in the Hungarian Tauffer database, “Big 2” conditions [Intrauterine growth restriction (i.e. small for gestational age) and (Low Apgar score)] a case-mix adjustment model was employed. Two primary outcomes were identified, obstetric interventions and perinatal mortality.

Results: In the examined period, there was a significant, continual incremental rise in the number of home births from 0.04 (2012) to 0.48% (2020) in Hungary, which represent an average of 0.22% per year (95% CI, 0.02-0.25). The maternal age was 33.16±4.71 and 29.69±5.44 years for home births and institutionalized births, respectively ($p<.001$). Women who choose homebirth were multiparous and the majority have experienced spontaneous mode of childbirth compared with mothers who gave birth at a health care institution ($p<.001$).

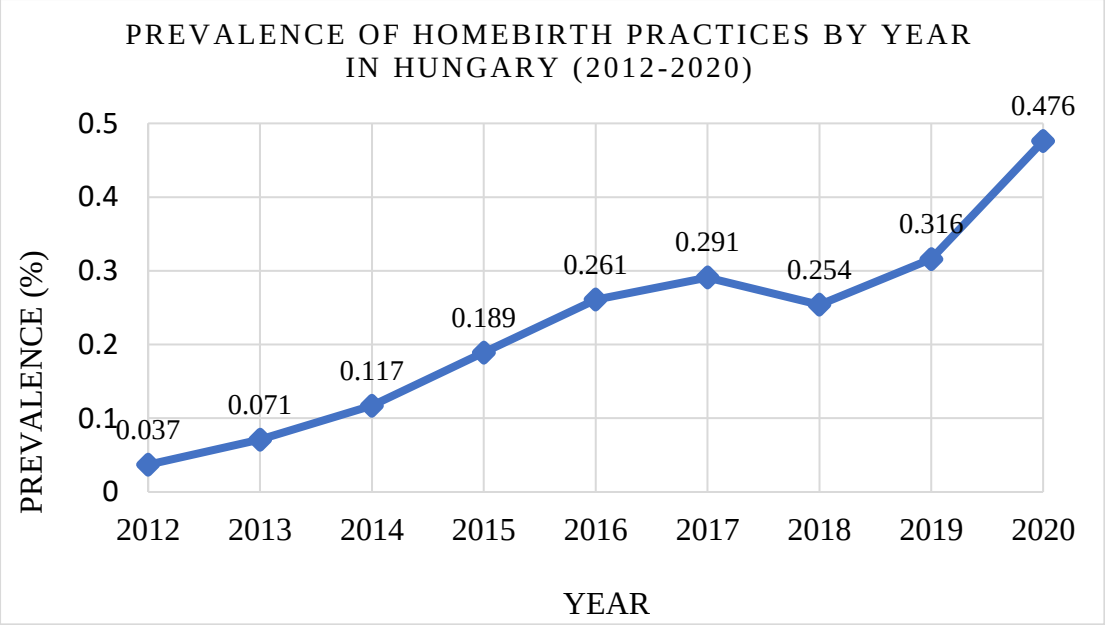


Figure 1: Trends of homebirth practices by year in Hungary (2012-2020)

Some pathology (primary uterine inertia, prolonged second stage labour and third stage haemorrhage) were prevalent among homebirth cases ($p<.05$); and associated with a cc. 12% rate of transfer to a health care institution. A slightly better Apgar score and relatively high rate (20%) of Caesarean deliveries were correlated with institutionalized births ($p<.05$).

Strength

- As far as we are aware, this is the first study of its sort to describe homebirth characteristics in Hungary.
- Notably, case-mix adjustment and intention-to-treat approach resulted in the most important aspect and strengthened our study. Without adjusting for this, one risks confounding the issue by indication bias.

Limitations

- Tauffer database is a compulsory database, however, some outcome variables were missed (like estimated volume of blood loss and birth outcomes of transferred cases) and less likely to be compared.

- The NICU admission, maternal weight (BMI), reason(s) used to transfer cases, and one-minute Apgar scores were not recorded in the compulsory database regarding homebirth cases.
- Lack of detailed information regarding maternal dropout and transfer for obstetric care, midwifery experiences, training, and their practices implemented in monitoring and evaluating foeto–maternal conditions before and during birth.
- Despite baseline matching the potential confounders and restriction to low-risk women in our study, the possibility of residual confounding cannot be excluded given an observational study.

Conclusions: Our study reveals a rising trend of home births in Hungary. Upon thorough examination, we find that institutional births generally exhibit better outcomes for both mothers and neonates, characterized by lower perinatal mortality rates and fewer maternal complications. However, with adherence to stringent clinical protocols and accurate identification of low-risk women, home birth could emerge as a viable alternative option.

3.3. Maternal and foeto-neonatal characteristics of childbirth in Ethiopia: A multilevel mixed-effect analysis

Background

In Ethiopia, many studies have characterized maternal mortality and its general causes; however, very limited studies have characterized foetal-maternal conditions peculiar to their desperate place of birth. Thus, this study aimed at exploring more characteristics and evidence related to maternal and newborn characteristics by birthplaces in Ethiopia.

Research question: Is there a association between birthplaces and foetal-maternal characteristics in Ethiopia?

Methods

A weighted sample of 7,590 women who had childbirths within five years preceding the survey using a most recent Ethiopian DHS data available at https://www.dhsprogram.com/ was used. STATA V15 software were used for the analysis. The main outcome variable is place of birth [0 - Homebirth, 1- Institutional birth].

A mixed-method multilevel regression models were employed, accounting for design and clustering effects. The first model is a Null model (I): using a Likelihood Ratio Test (LRT), Intraclass Correlation Coefficient (ICC), Median Odds Ratio (MOR) and Proportional Change in Variance (PCV). ICC is calculated as:

$$ICC = \sigma^2 / (\sigma^2 + \pi^2/3)$$

Where σ^2 stands for the variance between clusters, and $\pi^2/3$ is a constant term.

MOR is a measure of the variability by birthplace between clusters (184). It is calculated using the formula:

$$MOR = \exp (\sqrt{(2\sigma^2)} \times 0.6745)$$

$$= \exp (0.95\ \sigma)$$

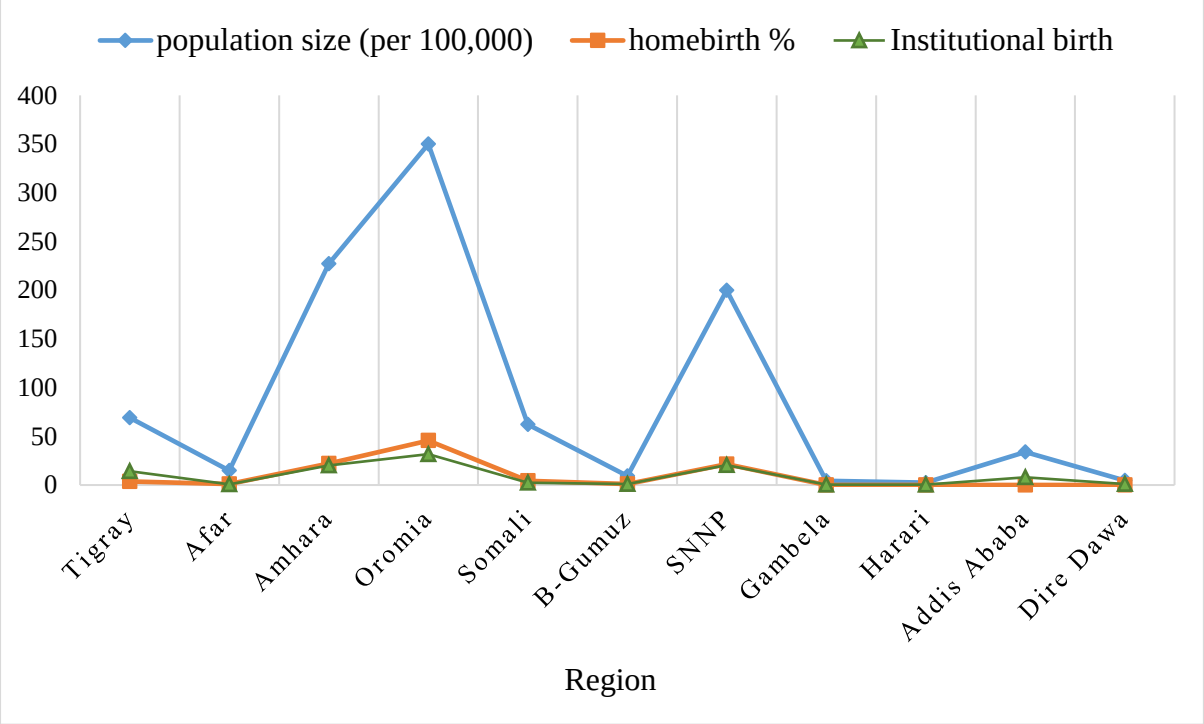
Where σ^2 stands for the variance between clusters, σ is the standard deviation between clusters.

PCV is a measure of the variation of birthplace that can be attributed to the inclusion of individual and community-level variables in a model (184,185). It is calculated using the formula:

$$PCV = (Var\ (null\ model) - Var\ (full\ model)) / Var\ (null\ model)$$

Model II: multilevel model at individual level, Model III: Multilevel model at community level, and Model IV: Adjusted for both level (mixed method model). Pseudo-multi-collinearity Dx (VIF>10 and CI>30 units) were used to adjust confounders.

The figure demonstrated that regions with bigger population size had higher proportions of home births than institutional births, while the two administrative cities (Addis Ababa and Dire Dawa) and Tigray region had more of institutionalized birth practices than home homebirth (Figure 6).

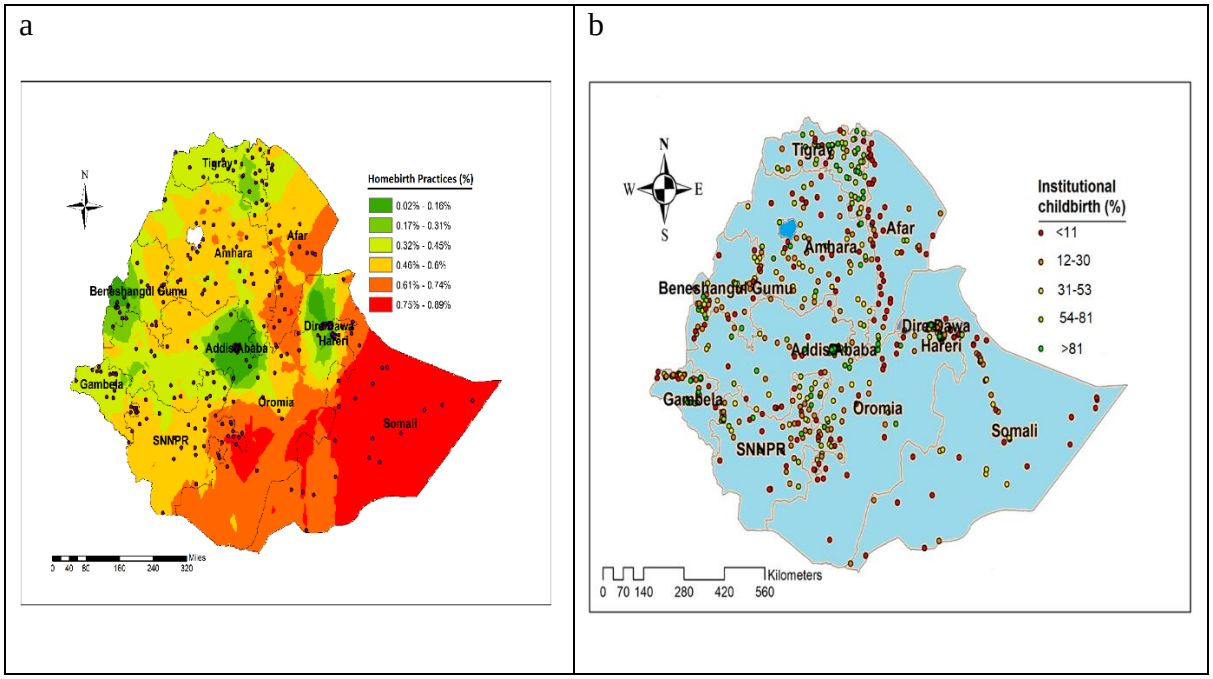


SNNP-Southern nation, nationalities, and people's region; (Source of the population size: http://www.csa.gov.et/ehioinfo-internal)

Figure 6: Proportions of home and institutional births by regions and population sizes in Ethiopia

Spatial analysis

The Ordinary Kriging spatial interpolation showed that there was a high percentage of home birth practices along the borders of the SNNPR, Afar, southern Oromia, and Somali regions. The Gettis-OrdGi statistical analysis revealed that, Addis Ababa city, Dire Dawa city, Hawassa town in SNNP, several sites in Benishangul-Gumuz, Gambella, and a small number of places in the Oromia region had the highest prevalence of institutional childbirths (Figure below).



SNNPR-Southern nation, nationalities, and people's region; EDHS- Ethiopian Demographic Health Survey; (Source: Shape file from Central Statistical Agency (CSA) of Ethiopia, 2013)

Figure 7: a) Kriging interpolation and analysis of homebirth practices in Ethiopia b) Spatial distribution of Institutional childbirths in Ethiopia, EDHS 2016

Strengths and limitations

This study's primary strength lies in utilizing a dataset that is nationally representative. With a vast amount of data available, it becomes possible to draw conclusions from the research findings. Nevertheless, a limitation associated with national surveys is the potential for recall bias, and poses a weakness that could influence causation, given that cross-sectional nature of the survey's study design. Furthermore, this study relied on secondary data, and while the EDHS interviews concentrated on demographic and socioeconomic factors, other elements such as cultural norms and issues related to accessibility that could affect facility-based and home-based childbirth were not accounted for in the survey tool.

4. DISCUSSIONS

Our study amalgamates findings from three distinct sub-studies to comprehensively explore the landscape of planned home births in European countries, the increasing trend of home births in Hungary, and the prevailing birthing practices in Ethiopia, within the context of up-to-date literature.

Sub-study 1 delved into the outcomes of planned home births in European countries, encompassing a systematic review and meta-analysis of a substantial sample size. Our findings align with current literature, suggesting that, particularly in well-integrated settings, planned home births are associated with favorable obstetric and maternal outcomes. Notably, the risk of stillbirth, neonatal mortality, and morbidity among strictly identified low-risk women appears comparable regardless of the planned birthplace.

Sub-study 2 focused on the increasing prevalence of home births in Hungary over time, juxtaposed against institutional deliveries. While home births are on the rise, institutional delivery has demonstrated superior outcomes, consistent with recent literature. Nonetheless, our findings suggest that home birth could potentially be a safe option provided strict selection criteria are applied to healthy, low-risk women with uncomplicated pregnancies. Drawing insights from nations with established home birth practices may offer valuable lessons for improving home birth outcomes in Hungary, in accordance with contemporary research perspectives.

Sub-study 3 delved into the birthing practices in Ethiopia, shedding light on the predominance of home births, particularly in regions with significant rural and nomadic populations. These findings are in line with current literature, highlighting the challenges associated with limited access to skilled birth attendants and the resultant risks to maternal and neonatal health. The

findings underscore the urgent need to enhance perinatal care services in these regions, staffed with trained birth attendants, consistent with recent recommendations in the literature.

5. SUMMARY OF THE NOVEL FINDINGS

- **Sub-study 1**:

  Our systematic review of 21 studies and meta-analysis of 20 studies in European countries involving approximately a 750,000 women samples supports the notion that planned home births, particularly in well-integrated settings, are associated with better obstetric and maternal outcomes. We logically came to the conclusion that whether a birth is planned to take place at home or in a hospital in European countries, the risk of stillbirth, neonatal mortality, or morbidity is almost the same among strictly identified low risk women. However, due to the heterogeneity across studies and the limited evidence for certain outcomes, interpretation must be exercised with caution.

- **Sub-study 2**:

  A total of 2,997 cases were considered in support of our comparative retrospective cohort analysis, which demonstrated an increase in home births in Hungary over time. However, institutional delivery has proven better outcomes than homebirth. Home birth can potentially be a safe option provided strict selection criteria for healthy, low-risk women with uncomplicated pregnancies. Furthermore, drawing on the experiences of nations where homebirth is a long-standing practice may improve the outcome of homebirths in Hungary.

- **Sub-study 3**

  A mixed-method multilevel regression models were employed. Data from the only recent and available Ethiopian Demographic and Health Survey (EDHS-2106) were analysed using weighted sample of 7,590 women who had birth within the five years preceding the survey. Our finding lends credence to the evidence that, in Ethiopia, most deliveries

occurred at home, with significant regional variations. The geospatial exploration demonstrated that localized clusters with a low prevalence of institutionalized births identified in the southeastern sections of Oromia, Somalia, Afar, and coastal areas of the Southern Nation, Nationalities, and People's regions (SNNPR), where pastoralist and nomadic communities predominantly reside. It is evident from our research that most births in these areas are attended by unskilled birth attendants, predominantly among women of low socioeconomic status and less educated rural residents. In light of these findings, enhancing perinatal care services, staffed with trained birth attendants, holds a significant promise.

Implementation suggestions and potential strategies

Collectively, our findings advocate for the enhancement of perinatal care services, irrespective of the planned birthplace, as a promising strategy to improve safety, satisfaction, and foeto-maternal outcomes, in line with the latest research trends. This approach not only benefits those opting for home births, predominantly low-risk women, but also presents a practical and cost-effective alternative to solely relying on institutional deliveries. However, it is imperative to recognize that deliveries with a higher likelihood of complications should still be managed at the facility level to ensure optimal outcomes for both mother and baby, aligning with current literature on birthing practices and safety standards.

LIST OF PUBLICATIONS AND SCIENTIFIC ACTIVITIES DURING PH.D. COURSE

1. Published full text articles:

Wami GA, Prémusz V, Csákány GM, Kálmán K, Vértes V, Tamás P. Characteristics of Homebirth in Hungary: A Retrospective Cohort Study. Int J Environ Res Public Health. 2022 Aug 22;19(16):10461. doi: 10.3390/ijerph191610461. PMID: 36012096; PMCID: PMC9407858.

Tamás P, Kovács K, Várnagy Á, Farkas B, **Wami GA**, Bódis J. Preeclampsia subtypes: Clinical aspects regarding pathogenesis, signs, and management with special attention to diuretic administration. Eur J Obstet Gynecol Reprod Biol. 2022 Jul 1; 274:175–81.

Tamás P, Betlehem J, Szekeres-Barthó J, Kovács K, **Wami GA**, Vértes V, Bódis J. A preeclampsia két arca [The two faces of preeclampsia]. Orv Hetil. 2022 Apr 24;163(17):663-669. Hungarian. doi: 10.1556/650.2022.32427. PMID: 35462351.

2. Articles related to dissertation currently under review.

Wami GA, Argefa TG, Prémusz V, Tamás P. *Maternal and foeto-neonatal characteristics of childbirth in Ethiopia: a multi-level mixed-effect analysis*, **under review** at Wiley, Journal of Obstetrics and Gynaecology International.

Wami G A, Kiptulon EK, Galgalo DA, Chauhan S, Prémusz V, Tamás P: *Effects of planned place of birth on obstetric interventions and feto-maternal birth outcomes in low-risk women: A systematic review and meta-analysis of European studies*, **under review** at BMC systematic review.

3. Additional articles currently under review

Kiptulon EK, **Wami GA**, Elmadani M, Klára S, Orsolya M, Adrienn US. The impact of organizational culture on work stress and career leaving among nurses: A systematic review, currently **under review** at BMC systematic review.

Galgalo D A, Mokaya P, Chauhan S, Kasmai EK, **Wami GA**, Ákos Várnagy, Viktória Prémusz: Utilization of maternal health care services among pastoralist community in Marsabit county, Kenya: a cross-sectional baseline survey, currently **under review** at BMC Reproductive Health

4. Abstracts chapter in book (conference paper) in "Health sciences":

Wami GA, Argefa TG, Prémusz V, Tamás P. Maternal and foeto-neonatal characteristics of childbirth in Ethiopia: a multi-level mixed-effect analysis, Value in Health November 2023, ISPOREurope 2023, Copenhagen, Denmark. https://doi.org/10.1016/j.jval.2023.09.1620

Wami GA, Olayemi O, Akpa OM, Gudissa GG, Premusz V, Tamas P. Factors affecting provisions of Quality Emergency Obstetric and Newborn Care (EmONC) services in public health facilities in Dire Dawa, Ethiopia: a qualitative study. IX. Interdiszciplináris Doktorandusz Konferencia 2020 [9th Interdisciplinary Doctoral Conference 2020] 595 p. pp. 575-588., 14 p. Publication:32007934.

Tamás, P; **Wami GA**. Az anyai centrális hemodinamika hatása a magzat súlyfejlődésére. In: Betlehem, József; Karamánné, Pakai Annamária (eds.). A szombathelyi felsőfokú szülésznőképzés 20 éves jubileuma és konferenciája: absztrakt kötet, Szombathely, Hungary: Pécsi Tudományegyetem Egészségtudományi Kar (PTE ETK) (2021) 110 p. pp. 63-63., 1 p. Publication:32094760

Wami GA, Prémusz V, György MC, Kovács K, Vértes V, Tamás P. Janus-kináz. inhibitorok. gyulladáscsökkentő. https://dosz.hu/fil/480381b03c5b02c2f15acd218d190f9044f34f94f6d74c54dcdd7866762e19ed

5. Other ongoing research work in "Health sciences":

Wami GA, Kiptulon EK, Galgalo DA, Prémusz V, Tamás P. Impact of midwifery-led care on the safety and outcomes of home birth in developed countries: A systematic review and meta-analysis. PROSPERO 2023 CRD42023439428 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42023439428

Chauhan S, Muka T, Jaswal N, Al-Debes W, Korovljev D, **Wami GA**, Acs P, Karsai I, Premusz V. Effect of Yoga on Anti-mullerian hormone AMH level and androgen level in female with polycystic ovarian syndrome – A Systematic Review and Meta-analysis. PROSPERO 2022 CRD42022342913 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42022342913

Prémusz V, Muka T, Chauhan S, Várnagy A, Bódis J, Makai A, Hock M, **Wami GA**. Effects of melatonin supplementation on sleep patterns and psycho-social distress in women undergoing assisted reproductive treatment - A systematic review and meta-analysis. PROSPERO 2022 CRD42022349542 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42022349542

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“In the tapestry of birth, whether in safety or uncertainty, joy triumphs over challenge,

…. transforming each moment into a celebration of resilience and new beginnings."