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Racial Concordance and Childbirth: A Deep Dive into Medical Delivery Practices

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Abstract

This paper examines the impact of racial concordance between mothers and healthcare providers on childbirth practices and health outcomes in Brazilian public hospitals. Using a novel dataset linking patients and providers across 15 million births, we compare deliveries where providers and patients share the same race to those where they do not. We find that racial concordance slightly increases vaginal delivery anesthesia use, emergency medication and modestly reduces cesarean section rates, tubal ligation, hospital stay length, and medical exams performed. We also find evidence that these effects are especially pronounced among Black mothers attended by Black providers. Lastly, our results indicate no significant impacts on maternal or infant health outcomes. Our findings contribute to the literature on healthcare disparities by highlighting how racial concordance may improve care delivery patterns without necessarily translating into immediate health outcome differences.

JEL classifications: I12, J13, J15, I18
Keywords: Racial concordance, Healthcare disparities, Obstetric care, Public health, Brazil

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1 Introduction

Over the past few decades, a growing body of research has documented persistent racial disparities in medical treatment, with racial minorities disproportionately experiencing worse health outcomes (e.g., Spitzer, 2020). These disparities are particularly pronounced in maternal and newborn health, where racial inequalities remain a pressing concern. Studies from various countries have shown that Black women face significantly higher risks of pregnancy-related death (Howell et al., 2013; Leal et al., 2017; Saucedo et al., 2013). Additionally, evidence from both Brazil and the United States indicates that Black women are less likely than white women to receive appropriate pain relief during or after delivery, even after accounting for socioeconomic differences (Badreldin et al., 2019; Leal et al., 2017).

Most existing studies on racial disparities in childbirth care focus on patients' race, documenting differences in the quantity and quality of care received by minority and non-minority groups. However, this approach often overlooks the role of provider race and the potential importance of racial concordance between patients and physicians on maternal and infant health outcomes. Recent work exploiting random assignment of patients to physicians has shown that racial concordance can significantly affect the overall quality of care (Alsan et al., 2019; Frakes and Gruber, 2022; Greenwood et al., 2020; Hill et al., 2023; Ye, 2023). This paper provides the first rigorous investigation of how racial concordance between mothers and the providers overseeing their deliveries influences medical practices and postnatal outcomes.

Drawing on newly assembled administrative data from Brazil that uniquely link mothers to the physicians and nurses who attended their deliveries, we examine interactions across approximately 15 million childbirths, comparing outcomes when the mother–provider pair shares the same racial classification versus when they do not. Our research design leverages the quasi-random assignment of providers to patients in hospital emergency departments, using fixed effects models. We study how racial concordance affects i) delivery-related procedures, such as the mode of delivery and use of pain relief medication; ii) complementary medical procedures, including exams and consultations; and iii) outcomes, such as labor complications, readmission rates, and Apgar scores. In doing so, we contribute to a deeper understanding of how race influences healthcare decision-making, extending the geographic, health domain, and outcome scope of prior studies in the field.

Our findings indicate that racial concordance between patients and providers is associated with modest but meaningful differences in maternal healthcare delivery. In particular, we observe a small increase in anesthesia use during vaginal deliveries, along with slight reductions in cesarean sections and tubal ligation rates. We also find a more pronounced increase—of approximately 5%—in the use of emergency medications during racially concordant encounters. This effect is

largely explained by higher administration rates of Anti-Rh(D) immunoglobulin, a critical treatment for preventing alloimmunization, particularly following the delivery of an Rh-positive newborn to an Rh-negative mother. In such cases, timely administration depends on effective communication and trust between physician and patient, conditions that racial concordance may help foster. Additionally, our results indicate that racial concordance is associated with shorter hospital stays and fewer medical exams, suggesting more streamlined clinical practices. In contrast, we find no statistically significant effects on final health outcomes, including maternal mortality, ICU admission, delivery complications, readmission rates, or Apgar scores.

Heterogeneity analyses provide further insight into the mechanisms behind these patterns. First, the effects of racial concordance change along the risk delivery level, where there may be more scope for communication and shared decision-making between providers and patients. In these cases, we observe more pronounced reductions in complementary procedures, leading to shorter hospital stays and lower expenditures without compromising health outcomes—pointing to potential efficiency gains. Second, we find that part of these effects are also concentrated among Black mothers treated by Black physicians, particularly for procedures in which we observe strong racial disparities in the data: the administration of pain relief during vaginal deliveries and emergency medications.

To assess the plausibility of our identification strategy, we conduct a comprehensive set of covariate balance tests, all of which support its internal validity. Racially concordant and discordant matches are highly similar across a wide range of pre-determined maternal characteristics, including delivery risk status, age, education, gestational length, and number of previous pregnancies. We also demonstrate that our main findings are robust across a variety of alternative specifications, including different definitions of racial concordance, control variables, fixed effects structures, and sample restrictions.

This study is connected to the literature examining the role of shared identities in medical care. Prior research has shown that racial concordance between patients and healthcare providers can influence multiple aspects of the healthcare experience. A large body of evidence finds that minority patients——especially Black individuals——often report lower quality communication, reduced satisfaction, and diminished trust when treated by providers of a different race (Boulware et al., 2016; Cooper et al., 2003; Shen et al., 2018). These disparities are frequently attributed to mismatches in communication styles and reduced interpersonal rapport. Moreover, racial bias——whether implicit, explicit, or statistical——can also influence clinical decisions, contributing to unequal treatment (Balsa et al., 2005; Chandra and Staiger, 2010; Green et al., 2007). Motivated by these mechanisms, recent studies using experimental and quasi-experimental designs have found that racial concordance improves treatment adherence, uptake of preventive care, and even mortality outcomes in some settings (Alsan et al., 2019; Frakes and Gruber, 2022; Greenwood et al.,

2020; Hill et al., 2023; Ye, 2023).

This study is connected to the literature examining the role of shared identities in medical care. Two recent studies investigate the impact of physician-patient racial matching in the context of overall medical care in emergency departments in Singapore and the United States (Hill et al., 2023; Ye, 2023). Both studies find that racial concordance improves patient outcomes, likely due to enhanced communication between patients and physicians. Unlike these papers, we examine racial concordance in the context of obstetrics, where we can identify detailed medical procedures and downstream outcomes. Our primary contribution is to determine whether racial concordance influences specific treatment decisions. In our context, racial differences are not associated with differences in mother tongue, as in Ye (2023). Furthermore, prior research has focused on milder, non-surgical cases, where effective communication between patients and physicians is likely crucial for health outcomes. In contrast, in cases like ours, the role of communication may be more limited, giving physicians greater autonomy in decision-making, some of which, in certain contexts such as low-risk settings, could raise concerns about undue influence in obstetric practices. Indeed, several studies have shown that physician choices around childbirth are often heavily influenced by their interests (Gruber et al., 1999; Johnson and Rehavi, 2016). Lastly, we are the first to investigate the effects of racial concordance in the context of a developing country, such as Brazil.

The remainder of this paper is organized as follows. Following this introduction, Section 2 presents a background of the Brazilian racial and healthcare context. Section 3 details the data sources and variables used in the empirical analysis. In Section 4, we present the econometric model and discuss our identification strategy. Section 5 presents the main results of the study. Finally, in Section 6, we conclude the paper.

2 Brazilian Racial and Healthcare Context

Understanding Brazil's racial classification system and healthcare structure is crucial for interpreting our assessment of racial concordance effects. Unlike in countries where race is primarily determined by ancestry or legal definitions, Brazil's racial classification is more fluid and socially constructed, based largely on phenotype (physical appearance) (Marteleto, 2012). These racial dynamics, combined with the structure of Brazil's public healthcare system, provide a unique setting to examine the role of racial concordance between patients and healthcare providers.

2.1 Brazilian Public Health System and Childbirth

Brazil's Unified Health System (*Sistema Único de Saúde, SUS*) was established under the 1988 Constitution to guarantee universal access to healthcare. SUS provides both preventive and curative

care through a network of public hospitals and privately managed facilities that operate under government contracts. All individuals, regardless of income or insurance status, can access healthcare services free of charge at any SUS facility. Approximately 75% of the population relies basically on SUS for medical care, a proportion that is even higher among pregnant women, with around 82% of births occurring in the public health system.

A key feature of childbirth care in SUS is its emergency-based admission model, which plays a crucial role in shaping the assignment of healthcare providers to patients. Unlike in private healthcare settings, where individuals can choose their physicians, women giving birth in SUS hospitals do not have the ability to select their attending obstetricians or nurses. Upon arrival at a hospital in labor, expectant mothers are assigned to the next available provider on duty, based on a predetermined work schedule. Physicians and nurses cannot sort themselves into specific cases, nor can they refuse to treat any patient under any circumstances. This institutional arrangement ensures that the matching between patients and providers follows a conditionally random process, eliminating concerns of selection bias and making it possible to isolate the effects of racial concordance on medical decisions and health outcomes.

Another important aspect of the Brazilian public health system is the separation between prenatal and delivery care, which further reinforces the quasi-random nature of physician-patient pairings. Prenatal care for low-risk pregnancies is typically provided at Basic Health Units (BHUs), where general practitioners or nurses conduct routine check-ups and monitor maternal health throughout pregnancy. However, these healthcare professionals do not attend deliveries, meaning that the physician overseeing labor is rarely the same provider who managed the patient's prenatal care. When labor begins, women are advised to seek care at a SUS hospital's emergency department, where they are assigned an attending obstetrician based on availability. High-risk pregnancies follow a different trajectory, with specialized care provided in hospital settings, and in some cases, scheduled labor. These instances, however, represent only about 15% of all deliveries and are not the focus of this study.

This institutional framework——characterized by the inability of patients to select their healthcare providers, the absence of provider self-selection, and the separation of prenatal and delivery care——creates a unique setting to study the impact of racial concordance in childbirth. The quasi-random assignment of patients to physicians mitigates concerns about endogenous sorting and prior physician-patient relationships, allowing for a rigorous analysis of how racial concordance influences medical decisions and postnatal outcomes.

2.2 Racial Classification in Brazil

The Brazilian Institute of Geography and Statistics (IBGE)[1] officially classifies individuals into five racial categories: White, *Pardo* (Mixed-race), Black, Asian, and Indigenous. The *Pardo* category encompasses individuals of mixed European (White and Black), African (Black), and Indigenous ancestry but does not include those of Asian descent. Unlike in the United States, where racial identity is often based on ancestry and legally codified definitions, racial classification in Brazil is fluid and highly influenced by social context (Marteleto, 2012).[2] This relative fluidity presents both opportunities and challenges in studying racial disparities in Brazil.

Given the complexities of racial classification in Brazil, in our study, we opt to adopt an approach that aligns with existing sociopolitical frameworks, particularly those widely used in Brazilian affirmative action policies and government programs (IBGE, 2019).[3] Our primary classification groups individuals into two broad categories:

- White – Includes individuals classified as White or Asian. This grouping reflects historical patterns in Brazil, where Asians, predominantly of Japanese descent, have achieved high socioeconomic status and are often analyzed alongside whites in racial studies.

- Non-white – Includes individuals classified as *Preto* (Black), *Pardo* (Mixed-race), and Indígena (Indigenous). This classification follows Brazil's affirmative action policies, which recognize these groups as historically disadvantaged (Francis and Tannuri-Pianto, 2012). IBGE also uses the term Negros to refer to individuals classified as either *Preto* or *Pardo*, reinforcing this aggregation.

To assess the robustness of our findings, we also implemented the alternative racial concordance approach that considers all five IBGE racial categories separately. Additional details about the dataset and its structure are presented in the following section.

[1]The IBGE (Instituto Brasileiro de Geografia e Estatística) is Brazil's official government agency responsible for collecting and analyzing statistical data on the country's population, economy, and geography. It conducts the national census and defines the racial classification system used in demographic and socioeconomic studies.

[2]For more information on IBGE's classifications and methodologies of the Brazilian Census and other similar databases, visit:`https://www.ibge.gov.br`.

[3]In the Brazilian context, aggregating White and Asian populations is a reasonable analytical choice given their similarities in educational attainment, socioeconomic status, and geographic distribution. Both groups also tend to be concentrated in more urbanized and economically developed areas, particularly in the South and Southeast regions, which contributes to similar patterns of access to services and opportunities. These patterns are documented in official reports by the IBGE'; for instance, see IBGE (2019) and IBGE (2022).

3 Data

This section describes the data sources, variables, and sample construction used in our causal assessment. First, we detail the data sources, including their scope and relevance to the study. Next, we discuss the key variables of interest, including outcome measures and treatment definitions. Finally, we provide some descriptive statistics that highlight relevant sample aspects of our dataset.

3.1 Data Sources

Our analysis draws on a unique and comprehensive dataset compiled from three major Brazilian administrative sources: SIH-SUS, RAIS, and SINASC. These datasets provide extensive information on hospitalizations, employment records, and live births, enabling a detailed examination of the impact of racial concordance in hospital admissions between patients and physicians or nurses, and its effects on healthcare delivery and outcomes.

We first collect data from SIH-SUS (*Sistema de Informações Hospitalares do SUS*), Brazil's Hospital Information System, which records all hospitalizations within the public healthcare system. This comprehensive dataset includes detailed information on patient demographics, diagnoses, procedures performed, lengths of hospital stay, and discharge outcomes. It allows us to analyze key clinical variables such as the mother's hospital stay duration, anesthesia use during delivery, type of delivery (cesarean or vaginal), and other pertinent deliveries medical procedures. Additionally, SIH-SUS provides information about the financial aspects of healthcare by capturing data on hospital reimbursements related to the procedures performed. This includes data on the number of clinical procedures, prescribed medications, total treatment costs, and materials collected for testing, enabling us to assess the economic dimensions of hospitalizations. It also provides crucial information about whether the mother's admission period involves a delivery risk. This delivery risk classification is based on pre-determined characteristics recorded at the moment of hospital admission, which include maternal health conditions, labor complications, and other relevant clinical factors. Lastly, SIH-SUS also records the racial classification of the mother, an essential variable for our analysis of racial concordance in healthcare outcomes.

Second, we also gather data from RAIS (*Relação Anual de Informações Sociais*). RAIS is an annual report that provides a comprehensive administrative dataset containing information on all formal employment relationships in Brazil. It includes detailed data on workers, such as race, gender, age, education level, and occupation, and their employers, including industry sector, size, and location. We use this RAIS information to determine the race and other characteristics of the physicians and nurses involved in the deliveries by matching doctors' IDs across datasets. This linkage allows us to obtain provider information, including physician and nurse characteristics, to construct the racial concordance variable, and also to control for potential confounding factors

related to provider attributes.

Finally, the last source of information is SINASC (*Sistema de Informações sobre Nascidos Vivos*), which records all live births in Brazil, including those in both private and public hospitals. Since our hospitalization data only covers the public sector, we focus solely on births happening in the SUS. This dataset provides additional information on newborns and mothers, including maternal race, which we use to enhance the accuracy of racial data and complement the SIH-SUS dataset when records are incomplete.[4] By incorporating this additional information, we increased the sample size by approximately 25%, from 12,315,334 to 15,394,168 observations. This sample size calculation is based on the subset with no missing race data for physicians (and nurses) or patients, excluding scheduled deliveries, which defines our final dataset. Additionally, SINASC also provides other relevant variables, such as birth weight, Apgar scores, gestational age, and maternal characteristics like the mother's education level. We use these variables in further robustness exercises and to assess the effects of racial concordance on infant health outcomes. The remaining data, containing missing race information for doctors, nurses, and mothers after the linkage process, are shown in the Appendix section in Figure A1.[5]

We investigate the role of racial concordance between patients and healthcare providers (physicians or nurses) in shaping clinical decisions and outcomes. To do so, we link multiple administrative datasets using unique identifiers, such as the national ID numbers of patients and healthcare staff, ensuring accurate matching across sources while maintaining confidentiality and adhering to data protection protocols. Our analysis focuses on the universe of childbirths recorded in Brazil's public healthcare system (SUS) between 2009 and 2019, a period during which approximately 20 million deliveries were registered. To improve comparability between groups and reduce potential bias, we exclude scheduled (elective) deliveries from our sample, resulting in a reduction of about 4.5% (758,685 births). After removing incomplete records, our final sample includes 15,394,168 deliveries, of which 96% (14,828,208) were performed by physicians and 4% (565,960) by nurses.

By integrating data from SIH-SUS, SINASC, and RAIS, our dataset offers a comprehensive view of hospital deliveries in Brazil, encompassing clinical outcomes, patient and provider characteristics, healthcare utilization, and socioeconomic factors. This allows us to rigorously examine how physician-patient racial concordance affects medical practices and outcomes.

[4]Since SINASC and SIH-SUS do not contain a unique patient ID, we employed a linkage process using shared information available in both datasets. The linkage variables include hospital code, mother's municipality of residence, mother's birth date, and hospital admission date.

[5]In Figure A1, it can be observed that certain periods, particularly before 2012, are more susceptible to incomplete race information, especially for patients. Since we observe several characteristics for these cases, even when race is missing, we can perform balance tests comparing groups with and without race data. The robustness check focusing on periods with fewer missing values is presented in the Appendix to assess the sensitivity of our results.

3.2 Outcomes Variables and Treatment Status

In the final dataset, we analyze 15,394,168 deliveries that took place in Brazilian public hospitals between 2009 and 2019.[6] This dataset provides a comprehensive overview of clinical outcomes, including key variables such as the mother's length of hospital stay, use of anesthesia during delivery, and type of delivery (cesarean section or vaginal birth). Additionally, it includes indicators for various medical procedures performed during or after delivery, such as emergency medications prescribed. More intensive outcomes are also recorded, including whether intensive care unit (ICU) services were required, whether maternal mortality occurred, and the maternal hospital readmissions within 30 days. This dataset also includes financial information, specifically the total cost of treatment, capturing the economic aspects of the healthcare services provided during hospitalization.

To further evaluate the racial concordance effects on maternal health, we have also developed additional outcome variables to enhance our analysis. One of these is a labor/delivery complication variable based on ICD classifications, which includes outcomes such as obstructed labor, postpartum hemorrhage, and other pregnancy-related complications. Additionally, we apply a similar approach to hospital readmissions within 30 days, breaking them and categorizing the readmissions into obstetric causes. This detailed classification allows for a more thorough investigation of how these specific outcomes are influenced by racial concordance in the delivery process.

Moreover, we incorporate essential demographic and socioeconomic variables to compare the treatment and control groups. These include maternal characteristics such as age, race or ethnicity, education level, and municipality of residence. This demographic information is sourced from both the SIH-SUS and SINASC datasets, adding greater detail to our causal assessment.

Treatment Status. Our primary variable of interest, the treatment variable RC_{iphb}, captures racial concordance, i.e., the racial match between the expectant mother (i) and the provider (p) at the hospital (h) on the birthdate (b). The definition of racial concordance is as follows:

$$RC_{iphb} = \begin{cases} 1 & \text{if the mother and provider belong to the same racial group} \\ 0 & \text{if they belong to different racial groups} \end{cases}$$

In this context, both mothers and providers are classified into two racial groups: White and Non-White, as explained in previous sections. By consistently applying these categories to both groups, we can systematically compare the effects of racial concordance on some health outcomes. Racial concordance occurs when the mother and provider belong to the same racial group, while

[6] According to SINASC data, more than 98% of all deliveries in Brazil occur in hospital facilities.

discordance arises when they do not. For example, if a mother classified as Non-White is treated by a physician also classified as Non-White, the pair is considered racially concordant. Conversely, if a Non-White mother is treated by a physician identified as White, the match is classified as racially discordant. This variable serves as a key measure for assessing how shared racial identity between patients and physicians may influence healthcare experiences and outcomes. As previously mentioned, given the Brazilian context, our primary empirical exercises rely on a binary racial classification——White and Non-White. This simplified approach reflects the country's sociopolitical dynamics, where racial boundaries are often fluid, yet the divide between White and Non-White individuals continues to shape social relations and healthcare experiences. In addition to our main treatment variable, we conduct a series of robustness checks that provide further depth to our analysis. These include redefining racial concordance using all five official IBGE categories——White, Black, Mixed, Asian, and Indigenous——instead of the binary grouping. We also explore the specific effects of concordance between Black providers and Black mothers. These additional exercises are not only methodological robustness checks but also substantively important, as they allow us to assess whether the effects we identify are driven by broader White/non-White dynamics or more specific racial interactions. The results of these supplementary analyses are presented in the Appendix.

Sample Descriptive Statistics. To understand the underlying patterns and contextualize our dataset, Table 1 presents the summary statistics of the variables used in our empirical analyses. It includes both treatment-related and health-outcome variables, and also some race descriptive statistics.

Table 1, Panel (A), presents descriptive statistics for the treatment status (i.e., racial concordance) and select individual characteristics, including the age of the mother and the provider (physician or nurse). The data show that racial concordance——defined as the matching of race between mother and provider——occurs in approximately 56.7% of observed deliveries. The average age of mothers in the sample is about 25 years, with a standard deviation of 6.5 years, indicating a relatively young population. Providers tend to be older, with a mean age of approximately 41 years, with a standard deviation of 11.8, reflecting their more advanced professional experience. Additionally, the vast majority of providers in our sample are male, who account for approximately 62% of the total.

Still, in the same table moving to Panel (B), it presents the descriptive statistics for the health outcome variables, highlighting clinical factors associated with the delivery process. The data shows that around 40.8% of deliveries in the sample are performed via C-section, a common outcome in many healthcare systems worldwide. One notable observation is the low use of anesthesia in vaginal deliveries, with the table indicating a rate of only 14%, and the average number of re-

imbursed medications administered per delivery is 0.0304, with a maximum of four. Additionally, the number of medical exams and clinical procedures performed during hospital stays averages 4.23 and 1.72, respectively, with a wide range. Also, the length of stay in hospitals averages 2.4 days, with a standard deviation of 2.3, indicating that the majority of deliveries are straightforward, but some may involve extended care. Moreover, total hospitalization expenditures vary considerably, with an average cost of R$662 and a standard deviation of R$219. Notably, the incidence of mothers' readmission within 30 days is low, at only 3.62%, and ICU usage is relatively rare, at 0.32%. In the same vein, maternal mortality is very rare, presenting an average of 0.02%, and labor/delivery complications occur in 9.2% of the cases, which aligns with typical rates seen in large, public healthcare datasets. Lastly, it is important to note that, depending on the variable, the SINASC data contain some missing values due to limitations in the linkage process.

In Table 1 Panel (C), the table presents a comparison of summary statistics for outcome variables and individual characteristics based on different classifications of maternal and provider race. First, notably, the statistics indicate that during the period 2009–2019, the vast majority of deliveries in the public healthcare system involved non-White mothers (76%). In contrast, White physicians and nurses constitute approximately 67% of the sample, suggesting a strong racial composition disparity between patients and healthcare providers.

Furthermore, the table also reveals that White mothers in the sample tend to have similar ages to non-white mothers. In contrast, differences are evident in the C-section rates administered. White mothers present a higher ratio of C-section rates, with approximately 45%, in comparison to non-White mothers, with around 39%. This indicates potential disparities in the mode of delivery across racial groups. Additionally, this is also evident around the use of anesthesia during vaginal deliveries. We can observe that it is marginally higher for white mothers (15.6%) compared to non-white mothers (13.3%). There are also notable differences in medical interventions, with white mothers receiving slightly more procedures and medications on average than non-White mothers.

Another notable factor pertains to financial disparities. White mothers incur slightly higher total expenditures (R$675.66) compared to non-White mothers (R$656.38), which may reflect differences in clinical complexity or healthcare utilization. Regarding readmission rates, the table shows a small difference by maternal race. White mothers have a readmission rate of 3%, while non-White mothers have a slightly higher rate of approximately 3.7%, suggesting potential disparities in post-discharge care. Additionally, the data indicate that ICU usage and maternal mortality are marginally higher among White mothers, although these differences remain relatively small.

Overall, the descriptive statistics suggest differences in healthcare experiences between White and non-White mothers, particularly in the likelihood of undergoing a C-section, the use of anesthesia during vaginal deliveries, and the number of medical exams and clinical procedures. While all these gaps may be driven by factors like medical necessity and systemic healthcare practices,

they also raise important questions about access and decision-making in maternal care. In this line, racial concordance can be a potential factor behind these variations, suggesting it may influence communication, treatment decisions, and overall quality of care. With this in mind, in the following sections, we outline our empirical approach to examining these disparity patterns, detailing how we estimate the causal effects of racial concordance on medical, maternal, and neonatal outcomes.

4 Empirical Strategy

In the previous section, we have detailed the data sources and variables underpinning our analysis. Here, we outline our empirical approach to estimate the impacts of provider-patient racial concordance. To do so, we leverage a highly granular daily panel dataset from Brazil that captures comprehensive patient-level information on medical procedures. By comparing outcomes between cases where providers and patients share the same race and those where they do not, our analysis specifically examines how racial concordance influences medical decisions during childbirth.

Background. Mothers giving birth in Brazilian public hospitals cannot select physicians (or nurses), and physicians cannot deliberately sort themselves into cases. In particular, mothers arriving in the hospitals are assigned to the emergency department to receive immediate care and have no choice but to see the next available physician. Moreover, physicians follow a predetermined work schedule and are therefore unable to control the types of patients arriving in the emergency department. Once a patient is assigned, physicians cannot refuse to treat her under any circumstances by law. This setting creates an environment where mothers are paired with physicians in a process that is conditionally random—a feature we exploit directly in our empirical strategy.[7]

Estimating Equation. To explore whether racial concordance leads to differential medical outcomes, we estimate the following regression model:

$$Y_{iphb} = \alpha + \beta\, RC_{iphb} + \theta X_{imht} + \gamma_{pht} + \gamma_{wmh} + \epsilon_{iphb}, \tag{1}$$

where Y_{iphb} is the outcome of interest for mother i, treated by physician p, at hospital h, and admitted at birthdate b. The variable RC_{iphb} is a dummy variable indicating racial concordance, equaling one if both the physician and mother are of the same race, and zero otherwise. The vector

[7]Throughout this section, the term "physicians" also includes nurses in cases where deliveries are administered exclusively by nursing staff. Our data capture the primary healthcare provider present during childbirth, whether a physician or a nurse, ensuring that the analysis accounts for both types of medical professionals.

X_{imht} includes a set of case characteristics, including the mother's race, age, and residential ZIP code.

Our baseline specification includes physician-year-hospital fixed effects, denoted as γ_{pht}, allowing us to identify the impact of race-match by exploiting comparisons between patients treated by the same physician (p) within the same year (t) and hospital (h), thereby ruling out the possibility that other physician-hospital differences correlated with race-match drive our results. Additionally, we control for calendar year fixed effects by incorporating day-of-the-week fixed effects (w), month-of-year fixed effects (m), and their interactions with hospital indicators (γ_{wmh}). This set of hospital-time fixed effects accounts for both time-varying organizational features of hospitals across days and years and potential changes in sample composition over time. This detailed structure allows us to compare highly similar births and mothers treated under the same hospital and temporal conditions, with racial concordance being the only systematic difference between groups. The error term, ϵ_{iphb}, captures the remaining random variation. In this equation, our coefficient of interest is β, which we interpret as the causal impact of race concordance on our main outcomes under certain identification assumptions.

Regarding inference, we cluster standard errors at the hospital level to accommodate correlation across cases treated in the same hospital, addressing both serial correlation and heteroskedasticity (Abadie et al., 2023). Additionally, since we perform several regression models on different outcome variables, we perform multiple hypothesis testing corrections using the Q-values from Anderson to account for the increased likelihood of false positives due to multiple comparisons. This adjustment ensures that our statistical inferences remain valid and robust, reducing the probability of Type I errors while allowing us to assess the consistency of our findings across different outcomes and model specifications (Anderson, 2008).[8]

Identification strategy. Our identification strategy relies on the assumption that, conditional on the physician-year-hospital fixed effects (γ_{pht}) and hospital-calendar fixed effects (γ_{wmh}), the assignment of patients to racially concordant providers is as good as random. This means that, within the same hospital and physician-year, any remaining variation in racial concordance is assumed to be exogenous to unobserved determinants of medical outcomes.

To assess the plausibility of this assumption, we test whether observable patient characteristics are balanced across racially concordant and discordant groups, conditional on the fixed effects. Specifically, we estimate the impacts of racial concordance on a range of pre-determined patient characteristics using our main specification. If the identification assumption holds, the estimated coefficient β should be close to zero, indicating that concordance is unrelated to factors that could

[8]The multiple comparison adjustments are performed within similar classes of outcome variables, ensuring that statistical corrections account for the inherent structure of the tested hypotheses.

bias our estimates.

Figure 1 summarizes these tests in graphical form. Panel (A) examines maternal delivery risk and age, two key variables available for the entire sample. We find no evidence that racial concordance is systematically associated with these baseline characteristics. Specifically, the estimated effect on the high-risk pregnancy indicator is precisely zero, as is the effect on the mother's average age. Similarly, no meaningful differences are observed in the distribution of maternal age across concordant and discordant pairs when analyzed by age brackets.

Panel (B) expands the analysis by incorporating additional pre-determined maternal characteristics available from the SINASC dataset, including education, gestational length, number of previous pregnancies, and number of prior child deaths. Within this additional test, racial concordance does not affect the likelihood of a mother being observed in SINASC, alleviating concerns about selective missingness in this enriched subset. For all other variables, the estimated differences between concordant and discordant groups remain close to zero and are economically negligible (less than 0.01 standard deviations), reinforcing the robustness of the balance. Together, the results of this figure provide strong support for the internal validity of our identification strategy.

5 Results

In this section, we present our main estimates on the impact of racial concordance in childbirth procedures and postnatal outcomes within Brazilian public hospitals. Our results are structured as follows. First, we assess the effects of racial concordance on medical interventions during delivery, as well as on maternal and infant health outcomes. Second, we explore potential heterogeneous effects based on maternal delivery risk and investigate whether the impacts are particularly pronounced in matches between Black mothers and Black healthcare providers. Lastly, we present additional analyses, including heterogeneity by provider type (i.e., physician or nurse), along with a series of robustness checks.

5.1 Main Effects of Racial Concordance on Delivery Outcomes

We start presenting the overall effects of racial concordance on multiple delivery-related procedures and maternal and infant outcomes. Given the large set of outcomes tested, we interpret statistical significance using Q-values, applying Anderson's correction for multiple hypothesis testing.

Delivery-Related Medical Procedures. Table 2 presents the estimated effects of racial concordance on medical procedures. In column (1), racial concordance is associated with a small

reduction in the probability of Cesarean delivery, significant at the 10% level. Column (2) shows a positive effect on anesthesia use during vaginal deliveries, also significant at the 10% level. Although both effects are small in magnitude relative to the control group mean (i.e., mean of the racial discordant group), the anesthesia result is particularly noteworthy in light of documented racial disparities in pain management. As we show later in the paper, Black mothers are significantly less likely to receive anesthesia during vaginal delivery——a gap that is partly mitigated when provider and patient share the same racial background. Columns (3) and (4) examine the effects of racial concordance on labor induction and tubal ligation. While we estimate a negative effect on labor induction, it is not statistically significant. In contrast, racial concordance is associated with a statistically significant reduction in the likelihood of tubal ligation, corresponding to a 2.1% decrease relative to the control group mean.[9]

Moving to Table 3, we provide the results on additional medical procedure outcomes. We find a decline in length of stay, medical exams, and total expenditures, where we only find significant effects on medical exams and length of stay (columns (1) and (3)), indicating that racial concordance does appear to influence the periods of hospitalization and some of the medical exams procedures. This finding suggests that racial concordance may be associated with more efficient care. However, this effect represents only a small change relative to the control group, corresponding to an average of around 0.1% decrease. To further explore these patterns, we disaggregate the medical exam outcomes in Appendix (Table A1), providing more detailed evidence on which specific procedures are driving the overall result. The breakdown reveals that the observed reduction in medical exams is primarily concentrated in laboratory, pathological, and radiological diagnostics. By contrast, there is no significant effect on the use of more technologically advanced exams such as CT scans or MRIs. Additionally, column (2) shows no significant effect of racial concordance on the number of clinical procedures performed. To further explore this outcome, Appendix Table A2 disaggregates clinical procedures into several categories, including medical consultations and various therapeutic interventions. The effects are uniformly null across all categories.

Furthermore, in Column (4) of Table 3, we observe a statistically significant increase in the use of emergency medications in racially concordant cases, corresponding to a 5% increase relative to the control group. A closer examination of the composition of emergency medications reveals

[9]This finding may carry important ethical and historical significance. Around the world, including in countries such as Canada and the United States, there is documented evidence of coerced or inadequately informed sterilization of women from marginalized populations, particularly in the late twentieth century (see Stote (2012)). While our data do not allow us to assess consent directly, we believe that the reduction in tubal ligation observed under racial concordance may reflect improved communication and respect for patient autonomy. In Brazil, voluntary surgical sterilization is regulated by Law nº 9.263/1996, as amended by Law nº 14.443/2022, which establishes several safeguards to ensure that sterilization is conducted ethically, voluntarily, and with full patient awareness. See: `https://www.gov.br/saude/pt-br/assuntos/noticias/2023/junho/ministerio-da-saude-orienta-gestores-sobre-laqueadura-e-vasectomia-no-sus` (accessed June 30, 2025).

that this effect is primarily driven by the administration of Anti-Rh(D) Immunoglobulin, a standard treatment used to prevent hemolytic disease of the newborn in cases of Rh incompatibility between the mother and the fetus. This pattern suggests that racial concordance may facilitate improved communication between providers and patients (Agbi et al., 2023). Supporting this interpretation, Appendix Table A3 disaggregates emergency medications and confirms that the observed increase is concentrated in the use of Anti-Rh(D) Immunoglobulin.[10]

Furthermore, although we observe a significant reduction in the number of medical exams, this does not translate into statistically lower medical expenditures (see column 4 of Table 3). One possible explanation is that delivery costs——whether for vaginal or Cesarean births——constitute the bulk of total expenditures, rendering them less sensitive to changes in ancillary procedures such as diagnostic exams. However, as we later show, racial concordance is associated with a significant reduction in total expenditures among low-risk deliveries, potentially due to more targeted and appropriate use of resources when trust and communication improve, especially in complex or ambiguous clinical scenarios.

Maternal and Infant Health Outcomes. Turning to assess the impacts of physician-patient racial concordance on maternal and infant health outcomes, Table 4 presents the estimated effects of racial concordance. Panel (A) reports no statistically significant effects on the probability of maternal readmission within 30 days, ICU admission, maternal mortality, or labor/delivery complications. Across all columns, the estimated coefficients have p-values well above the 0.1 threshold (Q-values), indicating that racial concordance does not appear to influence these outcomes.

Moreover, in Panel (B), we analyze the effects of racial concordance on immediate infant health outcomes, focusing on Apgar scores at 1 and 5 minutes. The Apgar test is a standardized assessment that evaluates a newborn's overall health shortly after birth, measuring five key criteria——heart rate, breathing effort, muscle tone, reflex response, and skin color——each scored from 0 to 2. The total score, ranging from 0 to 10, helps healthcare providers determine whether the baby requires immediate medical attention or is adjusting well to life outside the womb. The 1-minute score reflects how well the baby tolerated the birth process, while the 5-minute score indicates adaptation to extrauterine life. Our analysis finds no meaningful effect of racial concordance on either Apgar score.

[10]Although Anti-Rh(D) Immunoglobulin is recommended for Rh-negative mothers delivering Rh-positive newborns, its administration depends on the physician recognizing the incompatibility, prescribing the treatment, and communicating the need for timely administration. The vaccine requires maternal consent and must be administered in a hospital by a qualified provider. Despite clinical guidelines, adherence may vary——some mothers decline the vaccine, particularly if they do not intend to have more children. Still, it is recommended due to the risk of alloimmunization. Our finding that racial concordance increases the probability of Anti-Rh(D) administration suggests that improved communication and trust in racially concordant encounters may facilitate adherence to this preventive treatment.

Additionally, in Appendix Table A4, column (1), we examine the effect of racial concordance on the probability of receiving newborn care at birth, and in column (2), we test the effects on the probability of the vaginal delivery being performed in the birth center. Again, we estimate a precise null, indicating that racial concordance does not appear to impact these outcomes either. Furthermore, to explore potential causes of maternal hospital readmission, Appendix Table A5 disaggregates readmissions by specific causes. In particular, we estimate the effects of racial concordance on various types of postpartum complications that may lead to hospital readmission. Although the estimated effects are negative and very small, none are statistically significant at the 5% level. These findings suggest that racial concordance does not meaningfully influence hospital readmissions during the puerperium period.

Summary. Overall, our initial findings suggest that racial concordance between mothers and healthcare providers has a modest yet meaningful impact on certain medical procedures during childbirth. Specifically, we find statistically significant associations, with a slight reduction in both cesarean procedures and tubal ligations, shorter hospital stays, and fewer medical exams performed during the mother's stay, as well as small increases in anesthesia use during vaginal deliveries and the administration of emergency medications——particularly Anti-Rh(D) Immunoglobulin. While these effects are modest in magnitude, they point to potential improvements in care efficiency and patient-provider communication. In contrast, we find no evidence that racial concordance influences broader maternal outcomes such as hospital readmission, ICU admission, maternal mortality, or infant health outcomes, including Apgar scores at both 1 and 5 minutes.

Our results partially align with the existing literature on racial concordance in healthcare, supporting the hypothesis that race-matched patient-provider interactions can meaningfully influence treatment processes. The observed increase in medical assistance, such as the use of emergency medications upon admission, is consistent with findings from Alsan et al. (2019) and Greenwood et al. (2020), which suggest that racial concordance enhances communication, fosters greater trust, and leads to more intensive treatment. Additionally, the modest reductions in the number of medical exams performed resonate with findings from Hill et al. (2023), highlighting the potential for more efficient care delivery. The significant decrease in certain specific procedures parallels the work of Balsa et al. (2005) and Frakes and Gruber (2022), suggesting that racial concordance can shape clinical decision-making. However, unlike some prior studies that documented significant improvements in health outcomes, we find limited evidence of effects on maternal and infant health outcomes. This difference may reflect contextual factors related to the structure of Brazil's public healthcare system or differences in the settings analyzed.

5.2 Heterogeneous Effects by Maternal Delivery Risk

In this subsection, we analyze the potential heterogeneous effects of racial concordance on medical procedures and maternal and infant health outcomes based on maternal delivery risk. Delivery risk classification is primarily determined by pre-existing maternal characteristics recorded at the time of hospital admission, including maternal health conditions, labor/delivery complications, and other relevant clinical factors. This classification follows the structure of the SIH-RD dataset and differentiates between low-risk and high-risk deliveries. The results of this analysis are presented in Tables 5, 6, and 7.

Childbirth Medical Procedures by Delivery Risk. Tables 5 and 6 report the effects of racial concordance on medical procedures, dividing deliveries into two risk classifications: low-risk and high-risk. First, the results from Table 5 indicate that racial concordance statistically impacts certain delivery-related outcomes, particularly among low-risk deliveries. Significant effects are observed in columns (1), (3), and (7), where racial concordance is associated with a reduction in the probability of Cesarean delivery, anesthesia use during vaginal deliveries, and tubal ligation among low-risk mothers. Additionally, although the estimates for the probability of induction suggest a potential negative effect, the result is small and not statistically significant.

Moving to Table 6, we find that racial concordance is associated with broader effects on delivery outcomes among low-risk mothers. Column (1) shows a small but statistically significant reduction in the length of hospital stay at the 5% level, whereas column (2) indicates no significant effect for high-risk mothers. Similarly, column (3) reports a statistically significant decline in the number of clinical procedures performed in low-risk deliveries, also significant at the 5% level, suggesting potential efficiency gains. In column (5), we observe a significant reduction in the number of medical exams for low-risk mothers, significant at the 1% level, reinforcing the pattern of more targeted care in racially concordant pairs. Although these effects are statistically significant, their magnitudes remain relatively small compared to the control group means. Notably, while the estimates for high-risk deliveries are not statistically significant, all of the coefficients for this group are positive, suggesting a distinct pattern that contrasts with the negative effects observed among low-risk cases.

Moreover, Table 6 column (7), shows a positive and statistically significant effect on the number of emergency medications administered among low-risk mothers, significant at the 1% level. This corresponds to an approximate 5% increase relative to the control group mean and appears to be driven primarily by increased administration of Anti-Rh(D) Immunoglobulin. Overall, this pattern suggests that racial concordance may enhance patient-provider communication, facilitating better identification and implementation of clinical needs (Agbi et al., 2023). In our setting, although clinical criteria for Anti-Rh(D) administration are systematically available upon deliv-

ery, the actual administration depends on the physician's recognition of the need, prescription, and maternal consent. As such, improved communication and trust in racially concordant encounters may support greater adherence to this important preventive treatment. Still, in Table 6, column (9) shows a statistically significant reduction in total delivery expenditures among low-risk cases (significant at the 5% level), potentially reflecting the cumulative impact of the observed reductions in clinical procedures and medical exams.

Overall, these findings indicate that the benefits of racial concordance in medical procedures are primarily concentrated among low-risk deliveries. The results suggest that racial concordance may increase flexibility and discretion in clinical decision-making, with both positive and negative effects depending on the outcome considered, and that relational factors between patients and providers, particularly communication, play an important role in shaping the delivery of care.

Maternal and Infant Health Outcomes by Delivery Risk. Table 7 Panel (A) focuses on maternal outcomes, including 30-day readmission, ICU admission, maternal mortality, and labor/delivery complications. Across both low and high-risk groups, the estimated effects remain statistically insignificant, with all p-values well above conventional thresholds (Q-values), suggesting again that racial concordance does not influence maternal health outcomes. Panel (B) examines infant health outcomes, specifically Apgar scores at 1 and 5 minutes. The table results indicate no meaningful relationship between racial concordance and infant health measures.

In general, the findings suggest that the effects of racial concordance on delivery-related medical procedures are concentrated among low-risk deliveries, likely because medical staff have greater discretion and flexibility in these cases. Specifically, we observe a modest reduction in the probability of cesarean delivery and tubal ligation, increased use of anesthesia during vaginal births, fewer clinical procedures and medical exams, and a slight rise in emergency medication use——all exclusively among low-risk mothers. These patterns support the view that racial concordance may influence treatment intensity and procedural efficiency, especially in settings that allow for more provider autonomy and patient-provider communication.

5.3 Additional Robustness Checks and Additional Results

To further assess the robustness and reliability of our findings, we conducted a series of additional analyses, which are presented in the Appendix.

Robustness Check Results. We begin by evaluating the stability of our estimates through the incremental inclusion of fixed effects and individual control variables. Table A6 reports these results, showing how each specification step impacts the estimated coefficients. The final column

reflects our preferred specification, as outlined in equation 1. Overall, the results remain stable and consistent with those presented in the main analysis.

Second, we re-estimate the racial concordance effects by restricting our sample to data from 2012 to 2019, a period with fewer missing race observations.[11] The results, presented in Tables A7, A8, and A9, indicate that limiting the sample to these years does not materially affect our findings. The estimates remain similar in magnitude to our baseline results, though some lose statistical significance due to the reduced sample size. Nonetheless, the overall stability across specifications reinforces confidence in our conclusions.

Third, we modify the definition of the racial concordance variable by using all five official racial categories instead of the binary racial classification (White vs. Non-White). In general, the results, shown in Appendix Tables A10, A11, and A12, remain broadly consistent with our main findings in terms of the estimated sign and direction of effects. However, when using the more detailed disaggregated racial classification treatment status, the estimates tend to be slightly stronger and more precisely estimated. This pattern suggests that aggregating racial groups into a binary definition could modestly attenuate the estimated effects of racial concordance, possibly leading to a slight underestimation of the impacts in our primary specification. Together, all these robustness checks confirm that our conclusions are not driven by model specification choices or data limitations, further strengthening the credibility of our analysis.

Heterogeneous Effects by Type of Healthcare Provider. We also examine the potential heterogeneous effects of racial concordance by healthcare provider type. The results, presented in Appendix Tables A13, A14, and A15, explore these effects separately for physicians and nurses. To conduct this analysis, we divide the sample into two subsamples, estimating the impact of racial concordance within each group. Overall, the findings suggest that the observed effects are primarily driven by physician-patient racial concordance, indicating that physicians play a more influential role in shaping medical procedures and treatment decisions in this context.

Heterogeneous Effects by Race of the Patient and the Doctor. Lastly, we examine whether the effects of racial concordance differ according to the race of both patient and provider, with particular attention to interactions between Black mothers and Black physicians. The results, presented in Appendix Tables A16 to A18, suggest that this subgroup may be a key driver of our main findings. In particular, Tables A16 and A17 show that the positive association between racial concordance and anesthesia use during vaginal deliveries, as well as the modest reduction in hospital length of stay, are especially pronounced among Black mothers treated by Black doctors. These findings point to the potential role of improved communication, trust, and shared understanding in racially

[11] Descriptive statistics on missing race variables for different periods are provided in Figure A1 in the Appendix.

concordant encounters, particularly in mitigating longstanding disparities in pain management and the quality of maternal care during childbirth.

6 Conclusion

Our study provides novel empirical evidence on the role of racial concordance between mothers and healthcare providers in shaping medical decisions and maternal health outcomes in Brazil. Using a rich administrative dataset and leveraging the quasi-random assignment of physicians and nurses to deliveries in public hospitals, we estimate the impact of race matching on key medical interventions.

Our results show that racial concordance is associated with a modest increase in the likelihood of receiving anesthesia during vaginal deliveries and the use of emergency medications, as well as a slight reduction in cesarean procedures, tubal ligations, hospital stay length, and number of medical exams. These effects tend to be more apparent in low-risk deliveries and concordant matches between Black mothers and Black providers. Importantly, these changes in medical practice occur without adversely affecting maternal or infant health outcomes. Together, the findings underscore the nuanced ways in which racial dynamics shape the delivery of maternal care and highlight the importance of fostering a more diverse healthcare workforce.

Moreover, our results align with prior studies showing that racial concordance can improve healthcare interactions (Boulware et al., 2016; Cooper et al., 2003; Shen et al., 2018). We believe that medical attention is the primary mechanism driving these effects in the context of childbirth. Although we are unable to identify the underlying channels directly, our heterogeneity analyses offer suggestive evidence of an indirect mechanism. In particular, findings from low-risk deliveries and racially concordant interactions involving Black mothers indicate that trust and attention may play a central role in shaping these outcomes.

Our findings contribute to broader discussions on equity in healthcare and emphasize the importance of policies aimed at increasing diversity within the medical workforce. Beyond the influence of racial concordance on care, the results highlight the need for structural changes to ensure that all patients, regardless of racial background, receive equitable treatment. These changes may include expanding recruitment and retention programs for underrepresented minority physicians, incorporating cultural competence and bias-reduction training into medical education, and reforming provider assignment systems to promote more representative care teams. Future research could explore racial concordance within provider teams to better understand how team dynamics and shared identity among medical staff influence treatment decisions and outcomes.

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Table 1: Descriptive Statistics from Dataset Variables

Panel (A) - Treatment and individual characteristics

	Mean	SD	Min	Max	Obs	Data Source	Temporal Availability
Racial Concordance	0.567	0.495	0.000	1.000	15,394,168	All data	2009-2019
Mother's Age	25.056	6.524	0.000	98.00	15,394,168	SIH-SP-RD	2009-2019
Provider's Age	41.610	11.850	0.000	100.00	14,371,402	RAIS	2009-2019
Provider's Male	0.621	0.485	0.000	1.000	15,394,168	RAIS	2009-2019

Panel (B) - Outcomes variables

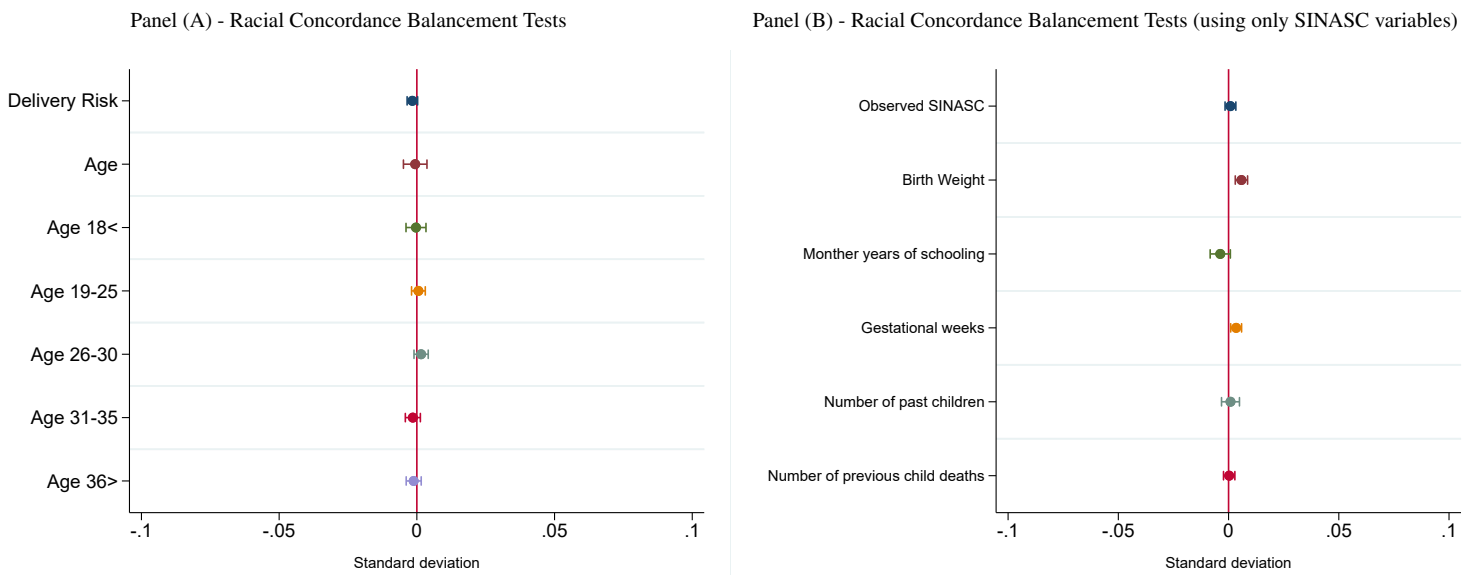
	Mean	SD	Min	Max	Obs	Data Source	Temporal Availability
C-section Delivery	0.4085	0.491	0.000	1.000	15,394,168	SIH-SP-RD	2009-2019
Use of Anesthesia on Vaginal Deliveries	0.140	0.347	0.000	1.000	9,104,231	SIH-SP-RD	2009-2019
Induction Delivery	0.2328	0.4226	0.000	1.000	10,769,691	SIH-SP-RD	2009-2019
Tubal Ligation	0.0132	0.1143	0.000	1.000	15,394,168	SIH-SP-RD	2009-2019
Number of Medications	0.0304	0.178	0.000	4.000	15,394,168	SIH-SP-RD	2009-2019
Number of Medical Exams	4.230	3.820	0.000	106	15,394,168	SIH-SP-RD	2009-2019
Number of Clinical Procedures	3.071	3.830	0.000	106	15,394,168	SIH-SP-RD	2009-2019
Length of Stay (in days)	2.416	2.332	0.000	342	15,394,168	SIH-SP-RD	2009-2019
Total Expenditures	662.774	219.575	0.000	61769	15,394,168	SIH-SP-RD	2009-2019
Readmission in 30 days	0.0348	0.183	0.000	1.000	15,394,168	SIH-SP-RD	2009-2019
Intensive Care Unit (ICU)	0.0032	0.0569	0.000	1.000	15,394,168	SIH-SP-RD	2009-2019
Maternal Mortality	0.0002	0.0153	0.000	1.000	15,394,168	SIH-SP-RD	2009-2019
Labor/Delivery Complications	0.0928	0.290	0.000	1.000	15,394,168	SIH-SP-RD	2009-2019
Apgar Score 1	0.5464	0.4978	0.000	1.000	11,049,262	SINASC	2009-2019
Apgar Score 5	0.9163	0.2768	0.000	1.000	11,053,559	SINASC	2009-2019

Panel (C) - Individual and Outcomes and characteristics by mothers' and providers' race

	Mean	SD	Min	Max	Obs	Data Source	Temporal Availability
White Mothers	0.3320	0.470	0.000	1.000	15,394,168	SIH-SP-RD	2009-2019
White Physicians and Nurses	0.6714	0.469	0.000	1.000	15,394,168	SIH-SP-RD	2009-2019
Mother's Age - White Mothers	25.430	6.532	0.000	96.00	5,100,082	SIH-SP-RD	2009-2019
Mother' Age - Non-White Mothers	24.871	6.505	0.000	98.00	10,294,086	SIH-SP-RD	2009-2019
Pregnancy Risk - White Mothers	0.100	0.300	0.000	1.000	5,100,082	SIH-SP-RD	2009-2019
Pregnancy Risk - Non-White Mothers	0.102	0.303	0.000	1.000	10,294,086	SIH-SP-RD	2009-2019
C-section - White Mothers	0.4482	0.448	0.000	1.000	5,100,082	SIH-SP-RD	2009-2019
C-section - Non-White Mothers	0.3889	0.4875	0.000	1.000	10,294,086	SIH-SP-RD	2009-2019
Tubal Ligation - White Mothers	0.0163	0.126	0.000	1.000	5,100,082	SIH-SP-RD	2009-2019
Tubal Ligation - Non-White Mothers	0.0127	0.1123	0.000	1.000	10,294,086	SIH-SP-RD	2009-2019
Induction - White Mothers	0.273	0.445	0.000	1.000	3,450,724	SIH-SP-RD	2009-2019
Induction - Non-White Mothers	0.3842	0.4886	0.000	1.000	8,286,868	SIH-SP-RD	2009-2019
Use of Anesthesia on Vaginal Deliveries - White Mothers	0.156	0.363	0.000	1.000	2,813,785	SIH-SP-RD	2009-2019
Use of Anesthesia on Vaginal Deliveries - Non-White Mothers	0.133	0.340	0.000	1.000	6,290,446	SIH-SP-RD	2009-2019
Number of Medications - White Mothers	0.040	0.1976	0.000	3.000	5,100,082	SIH-SP-RD	2009-2019
Number of Medications - Non-White Mothers	0.025	0.157	0.000	4.000	10,294,086	SIH-SP-RD	2009-2019
Number of Clinical Procedures - White Mothers	3.830	2.007	0.000	144	5,100,082	SIH-SP-RD	2009-2019
Number of Clinical Procedures - Non-White Mothers	3.657	1.986	0.000	107	10,294,086	SIH-SP-RD	2009-2019
Number of Medical Exams - White Mothers	4.519	4.019	0.000	144	5,100,082	SIH-SP-RD	2009-2019
Number of Medical Exams - Non-White Mothers	4.086	3.709	0.000	240	10,294,086	SIH-SP-RD	2009-2019
Length of Stay (in days) - White Mothers	2.456	2.019	0.000	336.00	5,100,082	SIH-SP-RD	2009-2019
Length of Stay (in days) - Non-White Mothers	2.392	2.468	0.000	342.00	10,294,086	SIH-SP-RD	2009-2019
Total expenditures - White Mothers	675.66	211.76	0.000	44444	5,100,082	SIH-SP-RD	2009-2019
Total expenditures - Non-White Mothers	656.38	223.06	0.000	61769	10,294,086	SIH-SP-RD	2009-2019
Readmission in 30 days - White Mothers	0.030	0.172	0.000	1.000	5,100,082	SIH-SP-RD	2009-2019
Readmission in 30 days - Non-White Mothers	0.037	0.189	0.000	1.000	10,294,086	SIH-SP-RD	2009-2019
Intensive Care Unit (ICU) - White Mothers	0.002	0.050	0.000	1.000	5,100,082	SIH-SP-RD	2009-2019
Intensive Care Unit (ICU) - Non-White Mothers	0.003	0.059	0.000	1.000	10,294,086	SIH-SP-RD	2009-2019
Maternal Mortality - White Mothers	0.0002	0.014	0.000	1.000	5,100,082	SIH-SP-RD	2009-2019
Maternal Mortality - Non-White Mothers	0.0002	0.0161	0.000	1.000	10,294,086	SIH-SP-RD	2009-2019
Labor/Delivery Complications - White Mothers	0.0989	0.294	0.000	1.000	5,100,082	SIH-SP-RD	2009-2019
Labor/Delivery Complications - Non-White Mothers	0.089	0.285	0.000	1.000	10,294,086	SIH-SP-RD	2009-2019
Apgar Score 1 - White Mothers	0.580	0.493	0.000	1.000	3,529,305	SINASC	2009-2019
Apgar Score 1 - Non-White Mothers	0.533	0.498	0.000	1.000	7,519,957	SINASC	2009-2019
Apgar Score 5 - White Mothers	0.920	0.271	0.000	1.000	3,530,693	SINASC	2009-2019
Apgar Score 5 - Non-White Mothers	0.914	0.279	0.000	1.000	7,552,866	SINASC	2009-2019

Note: This table presents summary statistics for the individual-level panel data variables. Panel (A) reports descriptive statistics for the treatment variable (racial concordance) and key individual characteristics, including both patients and providers. Panel (B) presents summary statistics for the main outcome variables, including delivery procedures, anesthesia use, hospitalization details, medical interventions, and infant health outcomes. Panel (C) provides summary statistics disaggregated by maternal and provider race, classifying mothers into White and Non-White groups. This classification follows the dataset's structure, where "Non-White" includes individuals categorized as Black, Pardo (Mixed-race), Indigenous, and Asian based on official Brazilian IBGE classifications. The dataset is constructed from three primary data sources: SIH-SP-RD (Hospital Admissions Data), RAIS (Employment and Provider Registry), and SINASC (Live Birth Records). The period of the dataset covers 2009 to 2019, with a total of 15,394,168 childbirth observations, depending on the outcome variable analyzed. All summary statistics are based on individual-level data, with continuous variables presented as means and standard deviations, while binary variables indicate proportions.

Figure 1: Racial Concordance Balancement Testing



Note: This figure contains two panels that summarize the results of the balance tests for racial concordance (both physician-patient and nurse-patient) for the period of 2009-2019. Panel (A) displays the balance test of our identification strategy using data from 15,394,168 childbirths in Brazil for deliveries administered by physicians and nurses. Panel (B) displays the balance tests for racial concordance using the SINASC data (using only matched individuals for SIH-SUS and SINASC data). Each estimated coefficient comes from a different regression model. All outcome variables are in standard deviation. The econometric model of both panels (A) and (B) follows the equation 1, it controls for physician-year-hospital fixed effects, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race and residential postal code. The confidence interval is at 95% and is calculated in pointwise form using cluster robust standard errors at the hospital level.

Table 2: Main Results of Effects of Racial Concordance on Delivery Medical Procedures Outcomes

	Prob. of C-section	Prob. of Anesthesia on Vaginal Deliveries	Prob. of Induction	Prob. of Tubal Ligation
	(1)	(2)	(3)	(4)
RC	-0.00136*	0.00100*	-0.00053	-0.00032*
	(0.00081)	(0.00045)	(0.00052)	(0.00014)
Control group mean	[0.3955]	[0.1369]	[0.2316]	[0.0147]
Q-Values (Anderson's Correction)	0.067	0.055	0.142	0.055
R^2	0.286	0.737	0.295	0.160
Observations	15,394,168	9,104,231	10,759,691	15,394,168

*Note: This table contains estimates of the effects of racial concordance (RC) for the years 2009 and 2019 in Brazil, using data from 15,394,168 childbirths. It provides the results of racial concordance on the delivery medical procedure outcomes. Such as the probability of C-section, probability of anesthesia on vaginal deliveries, probability of induction deliveries, and probability of tubal ligation. "Q-Values (Anderson's Correction)" refers to the p-value from the multiple hypothesis adjustment method. Values in parentheses represent robust standard errors clustered at the hospital level. The mean of the control group is shown in brackets. The econometric model controls for physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the multiple hypothesis adjustment Q-values (Anderson's Correction).*

Table 3: Main Results of Effects of Racial Concordance on General Medical Procedures Outcomes

	Length of Stay (in days)	Num. of Clinical Procedures	Num. of Medical Exams	Num. Emergency Medications	Total Expenditures
	(1)	(2)	(3)	(4)	(5)
RC	-0.00379*	0.00240	-0.00726*	0.00141***	-0.15185
	(0.00221)	(0.00177)	(0.00342)	(0.00020)	(0.25998)
Control group mean	[2.417]	[3.786]	[4.326]	[0.0283]	[662.044]
Q-Values (Anderson's Correction)	0.095	0.152	0.073	0.006	0.288
R^2	0.178	0.705	0.509	0.101	0.415
Observations	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168

*Note: This table presents estimates of racial concordance (RC) effects using Brazilian childbirth data (2009-2019) on medical procedure outcomes. It includes results for general medical procedures, such as length of stay (in days), number of clinical procedures, medical exams, emergency medications used, and total expenditures. "Q-Values (Anderson's Correction)" refers to the p-value from the multiple hypothesis adjustment method. Values in parentheses represent robust standard errors clustered at the hospital level. The mean of the control group is shown in brackets. The econometric model follows the equation 1, which controls for physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the multiple hypothesis adjustment Q-values (Anderson's Correction).*

Table 4: Main Results of Effects of Racial Concordance on Maternal and Infant Outcomes

	Panel (A): Maternal Outcomes				**Panel (B): Infant Health (Apgar)**	
	Prob. of Readmission in 30 Days	Prob. of ICU Admission	Prob. of Maternal Mortality	Prob. of Labor/Delivery Complication	Apgar Score (1 min.)	Apgar Score (5 min.)
	(1)	(2)	(3)	(4)	(5)	(6)
RC	-0.00010	0.00006	0.00002	-0.00053	0.00021	-0.00015
	(0.00019)	(0.00008)	(0.000014)	(0.00037)	(0.00054)	(0.00033)
Control group mean	[0.0319]	[0.0031]	[0.0002]	[0.0864]	[0.546]	[0.916]
Q-Values (Anderson's Correction)	0.866	0.866	0.859	0.859	0.866	0.866
R^2	0.086	0.122	0.084	0.278	0.305	0.148
Observations	15,394,168	15,394,168	15,394,168	15,394,168	9,742,059	9,746,043

*Note: This table presents estimates of racial concordance (RC) effects using Brazilian childbirth data (2009-2019) on maternal and infant outcomes. Panel (A) includes maternal outcomes such as the probability of readmission within 30 days, ICU admission, maternal mortality, and labor/delivery complications. Panel (B) presents results for infant health outcomes, measured by Apgar scores at 1 and 5 minutes. "Q-Values (Anderson's Correction)" refer to the p-values adjusted for multiple hypothesis testing. Values in parentheses represent robust standard errors clustered at the hospital level. The mean of the control group is shown in brackets. The econometric model follows the equation 1, which controls for physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the multiple hypothesis adjustment Q-values (Anderson's Correction).*

Table 5: Effects of Racial Concordance on Delivery Medical Procedures Outcomes by Maternal Delivery Risk

	Prob. C-section		Anesthesia on Vaginal Deliveries		Prob. of Induction		Prob. of Tubal Ligation	
	Low Risk (1)	High Risk (2)	Low Risk (3)	High Risk (4)	Low Risk (5)	High Risk (6)	Low Risk (7)	High Risk (8)
RC	-0.00155*	-0.00085	0.00092*	0.00213	-0.00057	-0.00008	-0.00043***	-0.00001
	(0.00085)	(0.0021)	(0.00044)	(0.00193)	(0.00080)	(0.00162)	(0.00014)	(0.00001)
Control group mean	[0.3682]	[0.5957]	[0.1390]	[0.1557]	[0.2324]	[0.2254]	[0.0172]	[0.00001]
Q-Values (Anderson's Correction)	0.073	1.000	0.059	1.000	0.136	1.000	0.009	1.000
R^2	0.306	0.365	0.748	0.757	0.303	0.347	0.225	0.427
Observations	13,829,144	1,565,024	7,735,189	539,803	9,567,328	1,202,363	13,829,144	1,565,024

*Note: This table presents the effects of racial concordance (RC) for the years 2009 and 2019 in Brazil, using data from 15,394,168 childbirths divided by maternal delivery risk. It provides the results of racial concordance on the delivery medical procedure outcomes. Such as the probability of C-section, probability of anesthesia on vaginal deliveries, probability of induction deliveries, and probability of tubal ligation. The mean of the control group is shown in brackets. "Q-Values (Anderson's Correction)" refers to the p-value from multiple hypothesis testing. "Low Risk" refers to deliveries without major pre-existing maternal conditions, while "High Risk" includes deliveries with complex conditions. The econometric model controls for physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels respectively.*

Table 6: Effects of Racial Concordance on General Medical Procedures Outcomes by Maternal Delivery Risk

	Length of Stay (in days)		Num. of Clinical Procedures		Num. of Medical Exams		Num. Emergency Medications		Total Expenditures	
	Low Risk	High Risk	Low Risk	High Risk	Low Risk	High Risk	Low Risk	High Risk	Low Risk	High Risk
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
RC	-0.00549**	0.00133	-0.00262**	0.00267	-0.00104***	0.0343	0.00145***	0.00108	-0.4004**	3.1172
	(0.00210)	(0.01015)	(0.00188)	(0.00533)	(0.00030)	(0.01851)	(0.0002)	(0.00074)	(0.1909)	(1.362)
Control group mean	[2.277]	[3.563]	[3.655]	[3.699]	[3.712]	[6.876]	[0.0269]	[0.0397]	[620.18]	[1039.78]
Q-Values (Anderson's Correction)	0.010	0.559	0.048	0.447	0.003	0.147	0.003	0.191	0.019	0.124
R^2	0.171	0.302	0.721	0.707	0.545	0.456	0.114	0.246	0.360	0.305
Observations	13,829,144	1,565,024	13,829,144	1,565,024	13,829,144	1,565,024	13,829,144	1,565,024	13,829,144	1,565,024

*Note: This table presents the effects of racial concordance (RC) for the years 2009 and 2019 in Brazil, using data from 15,394,168 childbirths divided by the delivery risk. The data were obtained from Datasus-SIH and RAIS. The table provides the results of racial concordance on general medical procedure outcomes. It includes results for length of stay (in days), number of clinical procedures, medical exams, emergency medications used, and total expenditures. "Q-Values (Anderson's Correction)" refers to the p-value from the multiple hypothesis adjustment method. "Low Risk" refers to deliveries without major pre-existing maternal conditions or severe pregnancy complications, while "High Risk" includes deliveries involving complex maternal health conditions, severe pregnancy complications, or other medical factors requiring specialized care. This classification follows the SIH-RD dataset structure. The econometric model follows the equation 1, which controls physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the multiple hypothesis adjustment Q-values (Anderson's Correction).*

Table 7: Effects of Racial Concordance on Maternal and Infant Outcomes by Maternal Delivery Risk

	Panel (A): Maternal Outcomes								**Panel (B): Infant Outcomes**			
	Prob. of Readmission (in 30 days)		Prob. of ICU Admission		Prob. of Maternal Mortality		Prob. of Labor/Delivery Complications		Apgar Scores (1 min.)		Apgar Scores (5 min.)	
	Low Risk	High Risk	Low Risk	High Risk	Low Risk	High Risk	Low Risk	High Risk	Low Risk	High Risk	Low Risk	High Risk
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RC	-0.00007	-0.00039	-0.00007	0.00089	0.00001	0.00001	-0.00044	-0.00107	0.00022	0.0003	-0.00020	-0.0003
	(0.00019)	(0.00075)	(0.00004)	(0.00055)	(0.00001)	(0.00008)	(0.00034)	(0.00134)	(0.00058)	(0.002)	(0.00034)	(0.0010)
Control group mean	[0.0374]	[0.0463]	[0.0013]	[0.0208]	[0.0002]	[0.0007]	[0.0711]	[0.1470]	[0.545]	[0.518]	[0.920]	[0.865]
Q-Values (Anderson's Correction)	0.645	1.000	0.480	0.749	0.480	1.000	0.480	1.000	1.000	1.000	1.000	1.000
R^2	0.086	0.212	0.106	0.277	0.091	0.223	0.304	0.346	0.328	0.313	0.159	0.264
Observations	13,829,144	1,565,024	13,829,144	1,565,024	13,829,144	1,565,024	13,829,144	1,565,024	9,806,965	1,242,297	9,810,243	1,243,316

*Note: This table presents the estimated effects of racial concordance (RC) on maternal and infant health outcomes in Brazil (2009-2018) using data from 15,394,168 childbirths. Panel (A) includes maternal outcomes such as the probability of readmission within 30 days, ICU admission, maternal mortality, and labor/delivery complications. Panel (B) presents results for infant health outcomes, measured by Apgar scores at 1 and 5 minutes. "Q-Values (Anderson's Correction)" refer to the p-values adjusted for multiple hypothesis testing. The deliveries are separated into "Low Risk" (no major pre-existing conditions) and "High Risk" (complex conditions requiring specialized care). Panel (B) shows infant Apgar scores. Q-Values use Anderson's correction for multiple hypothesis testing. Standard errors in parentheses. Control group means in brackets. Model includes physician-year-hospital and weekday-month-hospital fixed effects, plus mother's race, age, and location controls. Significance levels: *10%, **5%, ***1% after multiple testing adjustment. Observations rounded to thousands (k).*

Appendix A. Additional Material and Robustness Checks

In this appendix, we provide additional tables and figures that complement the main manuscript. These supplementary materials offer a more in-depth exploration of our paper and include robustness checks to validate our main findings further.

Appendix Tables Overview. First, Figure A1 presents a descriptive overview of missing race data for physicians, nurses, and patients over time, covering the period from 2009 to 2019. Second, Tables A1 to A5 investigate heterogeneous effects across a broader set of outcomes, disaggregated into clinical and diagnostic categories. In addition, Tables A6 to A12 report robustness checks on the effects of racial concordance on medical procedures and patient outcomes, including maternal and infant health indicators. These analyses assess the consistency of our main findings across a range of econometric specifications, including alternative fixed effects, control variables, and definitions of treatment status. We also explore heterogeneity by healthcare provider type. Tables A13 and A14 present results for delivery-related medical procedures separately for physicians and nurses, while Table A15 examines impacts on maternal and infant health outcomes. Finally, to better understand potential mechanisms, Tables A16 to A18 analyze racial concordance effects specifically among Black mothers treated by Black doctors, assessing whether these matches are potentially driving the main results.

Heterogeneous Effects on Complementary Outcomes (Clinical and Diagnostic). We further explore whether racial concordance influences a broader set of outcomes beyond those analyzed in the main text. Specifically, in Tables A1 to A5, we investigate potential heterogeneous effects across clinical and diagnostic procedures. This exercise allows us to assess whether the effects of racial concordance extend to different types of medical interventions, shedding light on possible mechanisms through which race-matching between patients and physicians might influence treatment patterns. Overall, the results suggest that while some outcomes show patterns consistent with our main findings, the evidence is generally mixed and varies across different categories of procedures.

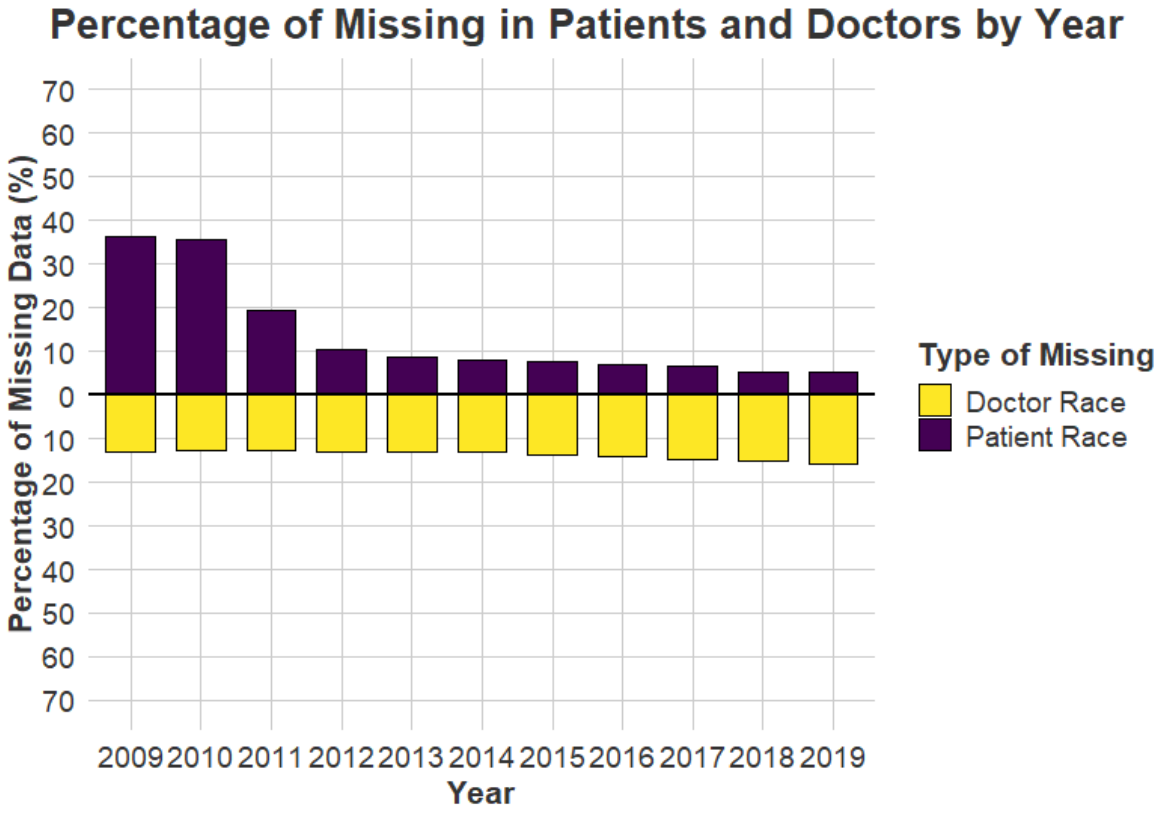
Sampling Restrictions. We examine the effects of racial concordance on medical procedures using data from the period 2012-2019. In this exercise, specifically, we exclude the periods with more missing data, from 2009 to 2011. This missing-period timing relation can be seen in Figure A1. The results are displayed in the following tables. Tables A7 and A8 present the effects of this sample restriction on medical procedure outcomes, while Table A9 reports the impacts of racial concordance on maternal and infant outcomes.

Alternative Treatment Classification. We also explore an alternative classification strategy by redefining treatment status based on a more granular racial categorization. Instead of the broader concordance measure used in the primary analysis, we define treatment strictly when both the patient and physician belong to the same racial group, following the five official IBGE racial classifications: White, *Pardo* (Mixed-race), Black, Asian, and Indigenous. This refined classification allows us to assess whether our results are sensitive to the definition of racial concordance. This exercise is displayed in the following tables, Tables A10, A11, and A12. Overall, these robustness checks suggest the stability of our main findings across sampling restrictions, alternative econometric specifications, and varying definitions of racial concordance. The estimated effects consistently align with our primary analysis, reinforcing the conclusion that physician-patient racial matching influences medical procedure outcomes. Notably, when employing a more detailed five-category racial classification, rather than the binary White versus Non-White distinction, the effects not only remain directionally consistent but also become slightly stronger and more precisely estimated.

Heterogeneous Effects by Type of Healthcare Provider. We also examine the potential heterogeneous effects of racial concordance by healthcare provider type. The results, presented in Tables A13, A14, and A15, explore these effects separately for physicians and nurses. To conduct this analysis, we divide the sample into two subsamples, estimating the impact of racial concordance within each group. Overall, the findings suggest that the observed effects are primarily driven by physician-patient racial concordance, indicating that physicians potentially play a more influential role in shaping medical procedures and treatment decisions within the context of racial concordance.

Heterogeneous Effects by Race of the Patient and Doctors. Finally, we investigate whether the effects of racial concordance are particularly concentrated in the matching of Black mothers with Black doctors. This analysis, presented in Tables A16 to A18, shows that the observed effects are more pronounced within this specific subgroup, suggesting that concordance between Black patients and Black physicians may play an important role in driving part of our main results. In particular, we find a stronger positive association with anesthesia use during vaginal deliveries and a modest reduction in the length of hospital stay among Black mothers treated by Black doctors. These patterns support the interpretation that improved communication and trust in racially concordant interactions may help mitigate racial inequities in pain management and maternal care during childbirth.

Figure A1: Descriptive of the Missing Race Variable for Physician, Nurse, and Patient



Note: This figure illustrates the missing data over time for physicians, nurses, and expectant mothers from 2009 to 2019 after merging with the SIH-SUS and SINASC data. The total sample size is 19,667,435 deliveries, including deliveries administered by physicians and nurses. After excluding observations with missing physician or patient race variables, scheduled deliveries, and deliveries performed by the nurses' staff, the sample size is reduced to 15,394,168, constituting the main dataset used in our empirical exercises.

Table A1: Heterogeneous Effects of Racial Concordance on Additional Medical Diagnostic Procedure Outcomes

Panel (A): Effects on Diagnostic Procedures (Part 1)							
Diagnosis by:	Sample Collection	Laboratory Diagnosis	Pathological Diagnosis	Radiological Diagnosis	Ultrasound Diagnosis	CT Scan Diagnosis	MRI Diagnosis
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
RC	-0.00005	-0.00667*	-0.00022*	-0.00100***	-0.00030	0.00001	-0.00001
	(0.00024)	(0.00032)	(0.00004)	(0.0001)	(0.0001)	(0.00001)	(0.00001)
Control group mean	[0.0151]	[3.193]	[0.094]	[0.027]	[0.095]	[0.011]	[0.0001]
Q-Values (Anderson's Correction)	0.587	0.073	0.073	0.001	0.105	0.200	0.200
R^2	0.782	0.444	0.294	0.117	0.303	0.092	0.100
Observations	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168
Panel (B): Effects on Diagnostic Procedures (Part 2)							
Diagnosis by:	Nuclear Medicine Diagnosis	Endocrinological Diagnosis	Radiology Specialist Diagnosis	Other Specialist Diagnosis	Hematological Diagnosis	Rapid Lab Test	
	(8)	(9)	(10)	(11)	(12)	(13)	
RC	-0.00001	0.00001	0.00001	0.00095	0.00001	0.00001	
	(0.00001)	(0.00001)	(0.00001)	(0.00035)	(0.00012)	(0.00031)	
Control group mean	[0.0001]	[0.00003]	[0.00008]	[0.280]	[0.011]	[0.595]	
Q-Values (Anderson's Correction)	0.657	0.716	0.657	0.370	0.657	0.907	
R^2	0.139	0.099	0.094	0.727	0.210	0.814	
Observations	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	

*Note: This table presents the effects of racial concordance on medical diagnosis outcomes for the years 2009 and 2019 in Brazil, using data from 15,394,168 childbirths. This classification follows the SIH-RD dataset structure. "Q-Values (Anderson's Correction)" refers to the p-value from the multiple hypothesis adjustment method. The econometric model follows the equation 1, which controls physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The mean of the control group is shown in brackets. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the Q-values (Anderson's Correction).*

Table A2: Effects of Racial Concordance on Additional Clinical Procedure Outcomes

	Medical Consultations	Physical Therapy	Non-Specialty Clinical Treatments	Kidney Disease Treatment	Blood Transfusion Therapy	Dental Care Procedures	Trauma Emergency Care	Advanced Therapy Services	Obstetric Services
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
RC	-0.00052	0.00036	0.00001	0.00001	-0.00010	0.00001	0.00001	0.00002	0.00264
	(0.00084)	(0.00025)	(0.00001)	(0.00001)	(0.00011)	(0.00001)	(0.00001)	(0.00002)	(0.00164)
Control group mean	[1.638]	[0.0798]	[0.00001]	[0.00005]	[0.0079]	[0.00012]	[0.00001]	[0.0003]	[2.0230]
Q-Values (Anderson's Correction)	0.688	0.688	0.688	0.688	0.688	0.688	0.688	0.688	0.688
R^2	0.823	0.721	0.091	0.095	0.089	0.350	0.045	0.102	0.340
Observations	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168

*Note: This table presents the effects of racial concordance on clinical procedure outcomes for the years 2009 and 2019 in Brazil, using data from 15,394,168 childbirths (directly depending on the outcome variable). This classification follows the SIH-RD dataset structure. "Q-Values (Anderson's Correction)" refers to the p-value from the multiple hypothesis adjustment method. The econometric model follows the equation 1, it controls for physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The mean of the control group is shown in brackets. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the Q-values (Anderson's Correction).*

Table A3: Effects of Racial Concordance on Emergency Medication Use During Delivery by Medication Type

Medication Types	Rh incompatibility Medications	Other Medications
	(1)	(2)
RC	0.00141***	-0.00002
	(0.00020)	(0.00002)
Control group mean	[0.0279]	[0.0001]
Q-Values (Anderson's Correction)	0.003	0.189
R^2	0.101	0.096
Observations	15,394,168	15,394,168

*Note: This table presents the effects of racial concordance on medication use outcomes by the type of emergency medication for the years 2009 and 2019 in Brazil, using data from 15,394,168 childbirths. This classification follows the SIH-RD dataset structure. "Q-Values (Anderson's Correction)" refers to the p-value from the multiple hypothesis adjustment method. The econometric model controls for physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The mean of the control group is shown in brackets. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the Q-values (Anderson's Correction).*

Table A4: Effects of Racial Concordance on Additional Delivery's Procedure Outcomes

Delivery Types	Newborn care at birth	Vaginal delivery in Birth Center
	(1)	(2)
RC	-0.00024	-0.00001
	(0.00021)	(0.00003)
Control group mean	[0.8058]	[0.0034]
Q-Values (Anderson's Correction)	1.000	1.000
R^2	0.846	0.788
Observations	15,394,168	15,394,168

*Note: This table presents the effects of racial concordance on additional delivery procedure outcomes for the years 2009 and 2019 in Brazil, using data from 15,394,168 childbirths. This classification follows the SIH-RD dataset structure. "Q-Values (Anderson's Correction)" refers to the p-value from the multiple hypothesis adjustment method. The econometric model controls for physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The mean of the control group is shown in brackets. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the Q-values (Anderson's Correction).*

Table A5: Heterogeneous Effects of Racial Concordance on Mothers' Readmission by Obstetric Causes

Readmission by type:	Hypertensive disorders of pregnancy	Other pregnancy-related maternal disorders	Maternal care due to fetal/delivery issues	Complications due to labor	Puerperium complications	Other obstetric conditions not classified
	(1)	(2)	(3)	(4)	(5)	(6)
RC	-0.00001	-0.00001	0.00003	0.00004	0.00001	0.00001
	(0.00004)	(0.00002)	(0.00004)	(0.00004)	(0.00007)	(0.00006)
Control group mean	[0.0010]	[0.0006]	[0.0014]	[0.0019]	[0.0051]	[0.0036]
Q-Values (Anderson's Correction)	1.000	1.000	1.000	1.000	1.000	1.000
R^2	0.109	0.047	0.039	0.060	0.079	0.075
Observations	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168

*Note: This table presents the effects of racial concordance on readmission by patient cause outcomes for the years 2009 and 2019 in Brazil, using data from 13,894,186 childbirths. This classification follows the SIH-RD dataset structure. "Q-Values (Anderson's Correction)" refers to the p-value from the multiple hypothesis adjustment method. The econometric model controls for physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The mean of the control group is shown in brackets. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the Q-values (Anderson's Correction).*

Table A6: Robustness Check of the Effects of Physician-Patient Racial Concordance on Medical Procedure and Patient Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel (A) - Probability of C-section				**Panel (B) - Anesthesia on Vaginal Deliveries**			
RC	-0.00077	-0.00127	-0.00127	-0.00136*	0.00098	0.00095**	0.00095**	0.00100**
	(0.00082)	(0.00082)	(0.00082)	(0.00081)	(0.00065)	(0.00045)	(0.00045)	(0.00045)
R^2	0.222	0.265	0.266	0.286	0.703	0.729	0.729	0.737
Control group mean	[0.3955]	[0.3955]	[0.3955]	[0.3955]	[0.1369]	[0.1369]	[0.1369]	[0.1369]
Observations	15,394,168	15,394,168	15,394,168	15,394,168	9,104,231	9,104,231	9,104,231	9,104,231
	Panel (C) - Probability of Induction Delivery				**Panel (D) - Probability of Tubal Ligation**			
RC	0.00060	0.00062	0.00062	0.00053	-0.00032**	-0.00033**	-0.00033**	-0.00032**
	(0.00051)	(0.00053)	(0.00053)	(0.00052)	(0.00015)	(0.00014)	(0.00014)	(0.00014)
R^2	0.215	0.295	0.295	0.295	0.084	0.137	0.137	0.160
Control group mean	[0.2316]	[0.2316]	[0.2316]	[0.2316]	[0.0147]	[0.0147]	[0.0147]	[0.0147]
Observations	10,769,691	10,769,691	10,769,691	10,769,691	15,394,168	15,394,168	15,394,168	15,394,168
	Panel (E) - Length of Stay (in days)				**Panel (F) - Number of Clinical Procedures**			
RC	-0.00276	-0.00364*	-0.00362*	-0.00379**	0.00150	0.00221	0.00221	0.00240
	(0.00218)	(0.00217)	(0.00217)	(0.00221)	(0.00181)	(0.00183)	(0.00183)	(0.00177)
R^2	0.118	0.161	0.161	0.178	0.678	0.696	0.696	0.705
Control group mean	[3.786]	[3.786]	[3.786]	[3.786]	[12.235]	[12.235]	[12.235]	[12.235]
Observations	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168
	Panel (G) - Number of Emergency Medications				**Panel (H) - Total Expenditures**			
RC	0.00149***	0.00140***	0.00140***	0.00141***	-0.05191	-0.17337	-0.17153	-0.15185
	(0.00020)	(0.00020)	(0.00020)	(0.00020)	(0.2852)	(0.2620)	(0.2620)	(0.2599)
R^2	0.039	0.092	0.092	0.101	0.367	0.409	0.409	0.415
Control group mean	[0.0283]	[0.0283]	[0.0283]	[0.0283]	[662.044]	[662.044]	[662.044]	[662.044]
Observations	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168
	Panel (I) - Readmission in 30 Days				**Panel (J) - Intensive Care Unit (ICU)**			
RC	-0.00005	-0.00011	-0.00011	-0.00010	0.00008	0.00006	0.00006	0.00006
	(0.00020)	(0.00018)	(0.00018)	(0.00019)	(0.00010)	(0.00008)	(0.00008)	(0.00008)
R^2	0.041	0.070	0.070	0.086	0.060	0.116	0.116	0.122
Control group mean	[0.0319]	[0.0319]	[0.0319]	[0.0319]	[0.0031]	[0.0031]	[0.0031]	[0.0031]
Observations	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168
	Panel (K) - Maternal Mortality				**Panel (L) - Labor/delivery Complication**			
RC	0.00001	0.00002	0.00002	0.00002	-0.00054	-0.00057	-0.00053	-0.00053
	(0.00001)	(0.00001)	(0.00001)	(0.000014)	(0.00037)	(0.00037)	(0.00037)	(0.00037)
R^2	0.026	0.068	0.068	0.084	0.228	0.266	0.266	0.278
Control group mean	[0.0002]	[0.0002]	[0.0002]	[0.0002]	[0.0864]	[0.0864]	[0.0864]	[0.0864]
Observations	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168
	Panel (N) - Apgar Score (1 min.)				**Panel (M) - Apgar Score (5 min.)**			
RC	0.00008	0.00022	0.00022	0.00021	-0.00018	-0.00017	-0.00017	-0.00015
	(0.00055)	(0.00055)	(0.00055)	(0.00054)	(0.00032)	(0.00033)	(0.00033)	(0.00033)
R^2	0.239	0.285	0.285	0.305	0.074	0.128	0.128	0.148
Control group mean	[0.546]	[0.546]	[0.546]	[0.546]	[0.916]	[0.916]	[0.916]	[0.916]
Observations	11,049,262	11,049,262	11,049,262	11,049,262	11,053,559	11,053,559	11,053,559	11,053,559
Fixed effects:								
Physician-year-hospital FE	✓	✓	✓	✓	✓	✓	✓	✓
Individual Controls		✓	✓	✓		✓	✓	✓
Week-day-month FE			✓	✓			✓	✓
Hospital-Week-day-month FE				✓				✓

*Note: This table presents robustness checks of the estimated effects of physician-patient racial concordance on medical procedures and patient outcomes in Brazil from 2009 to 2019, using 15,394,168 childbirths sourced from Datasus-SIH and RAIS (directly depending on the outcome variable). The table is structured into fourteen panels (A–N), each corresponding to a different outcome variable. Panel (A) examines the probability of C-section delivery. Panel (B) presents results on anesthesia use in vaginal deliveries. Panel (C) evaluates the probability of induction delivery. Panel (D) analyzes the probability of tubal ligation. Panel (E) measures the effect on the length of hospital stay (in days). Panel (F) assesses the number of clinical procedures performed. Panel (G) evaluates the number of emergency medications administered. Panel (H) analyzes total medical expenditures associated with deliveries. Panel (I) focuses on the probability of patient readmission within 30 days. Panel (J) examines the probability of admission to the intensive care unit (ICU). Panel (K) evaluates the likelihood of maternal mortality. Panel (L) analyzes the probability of labor or delivery complications. Panel (M) presents results on infant health outcomes, measured by Apgar scores at 5 minutes. Panel (N) presents results on Apgar scores at 1 minute. The last column, column (4), of each panel follows the econometric model described in Equation 1, controlling for physician-year-hospital fixed effects, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The mean of the control group is shown in brackets. Standard errors are clustered at the hospital level to account for within-hospital correlation, and are shown in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.*

Table A7: Main Results of Effects of Racial Concordance on Delivery Medical Procedures (**sample restricted for 2012-2019**)

	Prob. C-section	Anesthesia on Vaginal Deliveries	Prob. of Induction	Prob. of Tubal Ligation
	(1)	(2)	(3)	(4)
RC	-0.00083	0.00106*	-0.00038	-0.00028
	(0.00073)	(0.00044)	(0.00053)	(0.00016)
Control group mean	[0.4145]	[0.1474]	[0.2116]	[0.0154]
Q-Values (Anderson's Correction)	0.204	0.069	0.311	0.137
R^2	0.299	0.740	0.255	0.168
Observations	11,926,260	6,100,672	10,049,017	11,926,260

*Note: This table presents the effects of racial concordance for 2012-2019 in Brazil using data from childbirths. It provides the results of racial concordance on delivery medical procedure outcomes. Such as the probability of C-section, probability of anesthesia on vaginal deliveries, probability of induction deliveries, and probability of tubal ligation. The data were obtained from Datasus-SIH and RAIS. "Q-Values (Anderson's Correction)" refers to the p-value from the multiple hypothesis adjustment method. The econometric model controls for physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including mother's race, age, and residential postal code. The mean of the control group is shown in brackets. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the multiple hypothesis adjustment Q-values (Anderson's Correction).*

Table A8: Main Results of Effects of Racial Concordance on General Medical Procedures Outcomes (**sample restricted for 2012-2019)**

	Length of Stay (in days)	Num. of Clinical Procedures	Num. of Medical Exams	Num. Emergency Medications	Total Expenditures
	(1)	(2)	(3)	(4)	(5)
RC	-0.00263	0.00198	0.00478	0.00119***	-0.02728
	(0.0025)	(0.00161)	(0.0039)	(0.0002)	(0.2708)
Control group mean	[2.462]	[3.864]	[4.229]	[0.0283]	[663.63]
Q-Values (Anderson's Correction)	0.415	0.415	0.415	0.006	0.578
R^2	0.187	0.433	0.506	0.116	0.418
Observations	11,926,260	11,926,260	11,926,260	11,926,260	11,926,260

*Note: This table presents the effects of racial concordance for 2012 and 2019 in Brazil, the period with the least missing data, using data from 11,926,260 childbirths. The table provides the results of racial concordance on general medical procedure outcomes. It includes results for length of stay (in days), number of clinical procedures, medical exams, emergency medications used, and total expenditures. "Q-Values (Anderson's Correction)" refers to the p-value from the multiple hypothesis adjustment method. The table provides the results of racial concordance on medical procedure outcomes. The econometric model follows the equation 1, which controls physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The mean of the control group is shown in brackets. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the multiple hypothesis adjustment Q-values (Anderson's Correction).*

Table A9: Effects of Racial Concordance on Maternal and Infant Health Outcomes **(sample restricted for 2012-2019)**

	Panel (A): Maternal Outcomes				**Panel (B): Infant Outcomes**	
	Prob. of Readmission (30 Days)	Prob. of ICU Admission	Prob. of Maternal Mortality	Prob. of Labor/Delivery Complication	Apgar Score (1 min.)	Apgar Score (5 min.)
	(1)	(2)	(3)	(4)	(5)	(6)
RC	-0.00015	0.00007	0.00002	-0.00049	0.00019	-0.00009
	(0.00019)	(0.00010)	(0.00002)	(0.00038)	(0.00057)	(0.00036)
Control group mean	[0.042]	[0.003]	[0.0002]	[0.0763]	[0.547]	[0.915]
Q-Values (Anderson's Correction)	0.946	0.946	0.946	0.946	1.000	1.000
R^2	0.095	0.134	0.095	0.287	0.305	0.148
Observations	11,926,260	11,926,260	11,926,260	11,926,260	10,294,189	10,298,552

*Note: This table presents the estimated effects of racial concordance (RC) on maternal and infant health outcomes in Brazil between 2012 and 2019. The analysis is based on data from 11,926,260 childbirths (directly depending on the outcome variable), sourced from Datasus-SIH and RAIS. Panel (A) includes maternal outcomes such as the probability of readmission within 30 days, ICU admission, maternal mortality, and labor/delivery complications. Panel (B) presents results for infant health outcomes, measured by Apgar scores at 1 and 5 minutes. "Q-Values (Anderson's Correction)" refer to the p-values adjusted for multiple hypothesis testing. The reported coefficients represent the estimated impact of RC on these outcomes, with standard errors in parentheses. Q-Values use Anderson's correction for multiple hypothesis testing. Control group means are shown in brackets. The model includes physician-year-hospital and weekday-month-hospital fixed effects, plus mother's race, age, and location controls. Significance levels: *10%, **5%, ***1% after multiple testing adjustment.*

Table A10: Effects of Physician-Patient Racial Concordance on Delivery Medical Procedures **(Using Five-Race Classification)**

	Prob. C-section	Anesthesia on Vaginal Deliveries	Prob. of Induction	Prob. of Tubal Ligation
	(1)	(2)	(3)	(4)
RC	-0.00129	0.00193***	-0.00027	-0.00054***
	(0.00099)	(0.00055)	(0.00069)	(0.00017)
Control group mean	[0.3852]	[0.1349]	[0.2198]	[0.0133]
Q-Values (Anderson's Correction)	0.152	0.001	0.357	0.003
R^2	0.286	0.737	0.284	0.257
Observations	15,394,168	9,104,231	10,769,691	15,394,168

*Note: This table presents the estimated effects of racial concordance on medical procedure outcomes, using data from 15,394,168 childbirths in Brazil between 2009 and 2019. It provides the results of racial concordance on the delivery medical procedure outcomes. Such as the probability of C-section, probability of anesthesia on vaginal deliveries, probability of induction deliveries, and probability of tubal ligation. The data are sourced from Datasus-SIH and RAIS. The econometric model controls for physician-year-hospital fixed effects, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. Standard errors are clustered at the hospital level. The mean of the control group is shown in brackets. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the multiple hypothesis adjustment Q-values (Anderson's Correction).*

Table A11: Effects of Physician-Patient Racial Concordance on General Medical Procedure Outcomes **(Using Five-Race Classification)**

	Length of Stay (in days)	Num. of Clinical Procedures	Num. of Medical Exams	Num. Emergency Medications	Total Expenditures
	(1)	(2)	(3)	(4)	(5)
RC	-0.00918***	0.00182	-0.01770***	0.00181***	-0.3401
	(0.00282)	(0.00234)	(0.0049)	(0.00025)	(0.3449)
Control group mean	[2.3916]	[3.660]	[4.034]	[0.0262]	[655.123]
Q-Values (Anderson's Correction)	0.002	0.212	0.001	0.001	0.194
R^2	0.178	0.705	0.509	0.108	0.417
Observations	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168

*Note: This table presents the estimated effects of racial concordance on medical procedure outcomes, using data from 15,394,168 childbirths in Brazil between 2009 and 2019. It includes results for general medical procedures, such as length of stay (in days), number of clinical procedures, medical exams, emergency medications used, and total expenditures. "Q-Values (Anderson's Correction)" refers to the p-value from the multiple hypothesis adjustment method. The data are sourced from Datasus-SIH and RAIS. The econometric model controls for physician-year-hospital fixed effects, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. Standard errors are clustered at the hospital level. The mean of the control group is shown in brackets. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the multiple hypothesis adjustment Q-values (Anderson's Correction).*

Table A12: Effects of Physician-Patient Racial Concordance on Maternal and Infant Health Outcomes **(Using Five-Race Classification)**

	Panel (A): Maternal Outcomes				**Panel (B): Infant Outcomes**	
	Prob. of Readmission (30 Days)	Prob. of ICU Admission	Prob. of Maternal Mortality	Prob. of Labor/Delivery Complication	Apgar Score (1 min.)	Apgar Score (5 min.)
	(1)	(2)	(3)	(4)	(5)	(6)
RC	-0.000028	0.00002	-0.00001	-0.00103	-0.0004	-0.00045
	(0.000023)	(0.00009)	(0.00002)	(0.00046)	(0.00073)	(0.00043)
Control group mean	[0.0352]	[0.0033]	[0.0002]	[0.0781]	[0.5379]	[0.9146]
Q-Values	0.503	0.806	0.806	0.112	1.000	1.000
R^2	0.087	0.122	0.084	0.278	0.305	0.148
Observations	15,394,168	15,394,168	15,394,168	15,394,168	11,049,262	11,053,559

*Note: This table presents the estimated effects of racial concordance on maternal and infant health outcomes, using data from 15,394,168 childbirths in Brazil between 2009 and 2019. Panel (A) includes maternal outcomes such as the probability of readmission within 30 days, ICU admission, maternal mortality, and labor/delivery complications. Panel (B) presents results for infant health outcomes, measured by Apgar scores at 1 and 5 minutes. "Q-Values (Anderson's Correction)" refer to the p-values adjusted for multiple hypothesis testing. Data sourced from Datasus-SIH and RAIS. Q-Values use Anderson's correction. The model controls for physician-year-hospital and weekday-month-hospital fixed effects, plus mother's race, age, and location. Control group means in brackets. Standard errors clustered at the hospital level. Significance levels: *10%, **5%, ***1% after multiple testing adjustment.*

Table A13: Effects of Racial Concordance on Delivery Medical Procedures by Type of Healthcare Provider

	Prob. C-section		Anesthesia on Vaginal Deliveries		Prob. of Induction		Prob. of Tubal Ligation	
	Physician (1)	Nurse (2)	Physician (3)	Nurse (4)	Physician (5)	Nurse (6)	Physician (7)	Nurse (8)
RC	-0.00154	-	0.00080	0.00337	-0.00058	0.00073	-0.00037*	-
	(0.00085)	-	(0.00048)	(0.00211)	(0.00053)	(0.00303)	(0.00015)	-
Control group mean	[0.4003]	-	[0.1366]	[0.0996]	[0.2852]	[0.2287]	[0.0159]	-
Q-Values	0.107	-	0.107	0.283	0.147	0.681	0.060	-
R^2	0.275	-	0.757	0.565	0.283	0.466	0.160	-
Observations	14,828,208	-	8,581,126	565,960	10,305,312	464,379	14,828,208	-

*Note: This table presents duplicate estimates of racial concordance effects on delivery procedures by healthcare provider type in Brazil (2009-2019). Columns 1-4 and 5-8 show identical results for comparison purposes. It provides the results of racial concordance on the delivery medical procedure outcomes. Such as the probability of C-section, probability of anesthesia on vaginal deliveries, probability of induction deliveries, and probability of tubal ligation. Data were obtained from Datasus-SIH and RAIS. "Q-Values (Anderson's Correction)" refers to the p-value from the multiple hypothesis adjustment method. Values in parentheses represent robust standard errors clustered at the hospital level. The mean of the control group is shown in brackets. The econometric model controls for physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the multiple hypothesis adjustment Q-values (Anderson's Correction).*

Table A14: Effects of Racial Concordance on General Medical Procedures Outcomes by Type of Healthcare Provider

	Length of Stay (in days)		Num. of Clinical Procedures		Num. of Medical Exams		Num. of Emergency Medications		Total Expenditures	
	Physician (1)	Nurse (2)	Physician (3)	Nurse (4)	Physician (5)	Nurse (6)	Physician (7)	Nurse (8)	Physician (9)	Nurse (10)
RC	-0.00417*	0.00165	0.00306*	-0.00729	-0.00680*	-0.0110	0.00148***	0.0006	-0.1827	0.7289
	(0.00230)	(0.00581)	(0.00176)	(0.00840)	(0.00355)	(0.00983)	(0.0002)	(0.0098)	(0.2749)	(0.5739)
Control group mean	[2.411]	[2.100]	[3.720]	[5.206]	[4.176]	[5.482]	[0.0302]	[0.0334]	[663.63]	[578.94]
Q-Values (Anderson's Correction)	0.090	1.000	0.090	1.000	0.090	1.000	0.001	1.000	0.115	1.000
R^2	0.194	0.396	0.692	0.849	0.307	0.587	0.114	0.274	0.430	0.619
Observations	14,828,208	565,960	14,828,208	565,960	14,828,208	565,960	14,828,208	565,960	14,828,208	565,960

*Note: This table presents the effects of racial concordance on medical procedure outcomes (2009-2019 Brazil), excluding delivery procedures. It includes results for general medical procedures, such as length of stay (in days), number of clinical procedures, medical exams, emergency medications used, and total expenditures. "Q-Values (Anderson's Correction)" refers to the p-value from the multiple hypothesis adjustment method. Values in parentheses represent robust standard errors clustered at the hospital level. The mean of the control group is shown in brackets. The econometric model controls for physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the multiple hypothesis adjustment Q-values (Anderson's Correction).*

Table A15: Effects of Racial Concordance on Maternal and Infant Outcomes by Healthcare Provider

	Panel (A): Maternal Outcomes								**Panel (B): Infant Outcomes**			
	Prob. of Readmission (in 30 days)		Prob. of ICU Admission		Prob. of Maternal Mortality		Prob. of Labor/Delivery Complications		Apgar Scores (1 min.)		Apgar Scores (5 min.)	
	Physician	Nurse	Physician	Nurse	Physician	Nurse	Physician	Nurse	Physician	Nurse	Physician	Nurse
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RC	-0.00013	0.00068	0.0004	0.00018	0.0002	0.00002	0.00001	0.0009	0.00004	0.00179	-0.00018	0.00003
	(0.00019)	(0.00082)	(0.0008)	(0.00024)	(0.0001)	(0.00003)	(0.00038)	(0.00083)	(0.0005)	(0.00240)	(0.0003)	(0.00116)
Control group mean	[0.0432]	[0.0275]	[0.003]	[0.0009]	[0.0002]	[0.00003]	[0.0787]	[0.0020]	[0.547]	[0.540]	[0.915]	[0.910]
Q-Values (Anderson's Correction)	1.000	1.000	1.000	1.000	0.226	1.000	1.000	1.000	1.000	1.000	1.000	1.000
R^2	0.089	0.216	0.127	0.311	0.091	0.353	0.357	0.393	0.317	0.400	0.160	0.307
Observations	14,828,208	565,960	14,828,208	565,960	14,828,208	565,960	14,828,208	565,960	7,232,003	472,236	7,235,158	472,680

*Note: This table presents the effects of racial concordance (2009-2019) in Brazil, using data from 15,394,168 childbirths stratified by healthcare provider. It provides the effects of racial concordance on maternal and infant outcomes. Panel (A) includes maternal outcomes such as the probability of readmission within 30 days, ICU admission, maternal mortality, and labor/delivery complications. Panel (B) presents results for infant health outcomes, measured by Apgar scores at 1 and 5 minutes. "Q-Values (Anderson's Correction)" refer to the p-values adjusted for multiple hypothesis testing. The deliveries are separated by provider type: "Physician" (doctor-attended deliveries) and "Nurse" (nurse-attended deliveries). "Q-Values (Anderson's Correction)" refers to the p-value from the multiple hypothesis adjustment method. Values in parentheses represent robust standard errors clustered at the hospital level. The mean of the control group is shown in brackets. The econometric model controls for physician-year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively, following the multiple hypothesis adjustment Q-values (Anderson's Correction).*

Table A16: Racial Heterogeneous Effects of Racial Concordance on Delivery Medical Procedures Outcomes

	Prob. C-section	Anesthesia on Vaginal Deliveries	Prob.of Induction	Prob. of Tubal Ligation
	(1)	(2)	(3)	(4)
Black-patients	-0.01751***	-0.00652***	0.00058	0.00042**
	(0.00150)	(0.0008)	(0.00065)	(0.00018)
Black-doctors	-0.00552	-0.00280**	0.00243	-0.00053**
	(0.00729)	(0.00134)	(0.00155)	(0.00071)
Black-patients X Black-doctors	0.00285	0.00245***	0.00005	-0.00017
	(0.00420)	(0.00092)	(0.00128)	(0.00038)
R^2	0.193	0.717	0.260	0.114
Observations	15,394,168	9,104,231	10,769,971	15,394,168

*Note: This table presents the heterogeneous effects of racial concordance for the years 2009 and 2019 in Brazil, using data from 15,394,168 childbirths divided by type of healthcare provider. It provides the results of racial concordance on delivery medical procedure outcomes. Such as the probability of C-section, probability of anesthesia on vaginal deliveries, probability of induction deliveries, and probability of tubal ligation. This outcomes classification follows the SIH-RD dataset structure. The econometric model follows the equation 1, it controls for year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The control group mean is shown in brackets. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels.*

Table A17: Racial Heterogeneous Effects of Racial Concordance on General Medical Procedures Outcomes

	Length of Stay (in days)	Number of Clinical Procedures	Number of Medical Exams	Num. Emergency Medications	Total Expenditures
	(1)	(2)	(3)	(4)	(5)
Black-patients	0.00700***	0.03282***	0.05333***	-0.00627***	-2.99896***
	(0.00248)	(0.00330)	(0.00503)	(0.00026)	(0.38230)
Black-doctors	0.01774*	0.01576	0.0329**	-0.00163***	1.5120
	(0.01012)	(0.01465)	(0.01542)	(0.00034)	(2.7305)
Black-patients X Black-doctors	-0.00970*	-0.00794	-0.01412	0.00219***	0.3095
	(0.00530)	(0.00870)	(0.00896)	(0.00036)	(1.0714)
R^2	0.157	0.678	0.496	0.096	0.371
Observations	15,394,168	15,394,168	15,394,168	15,394,168	15,394,168

*Note: This table presents the heterogeneous effects of racial concordance for the years 2009 and 2019 in Brazil, using data from 15,394,168 childbirths divided by type of healthcare provider. It includes results for general medical procedures outcomes, such as length of stay (in days), number of clinical procedures, medical exams, emergency medications used, and total expenditures. This outcomes classification follows the SIH-RD dataset structure. The econometric model follows the equation 1, it controls for year-hospital, weekday-month-hospital fixed effects, and individual characteristics, including the mother's race, age, and residential postal code. The mean of the control group is shown in brackets. The symbols *, **, and *** denote statistical significance at 10%, 5%, and 1% levels.*

Table A18: Racial Heterogeneous Effects of Racial Concordance on Maternal and Infant Health Outcomes

	Panel (A): Maternal Outcomes				**Panel (B): Infant Outcomes**	
	Prob. of Readmission (30 Days)	Prob. of ICU Admission	Prob. of Maternal Mortality	Prob. of Labor/Delivery Complication	Apgar Score (1 min.)	Apgar Score (5 min.)
	(1)	(2)	(3)	(4)	(5)	(6)
Black-patients	0.00026*	0.00021***	0.00003*	-0.00370***	-0.00489***	0.00197***
	(0.00015)	(0.00006)	(0.00001)	(0.00073)	(0.00059)	(0.00031)
Black-doctors	0.00026	0.00027	0.00006**	-0.00307	-0.00221	-0.00027
	(0.00036)	(0.00041)	(0.00003)	(0.00278)	(0.00183)	(0.00081)
Black-patients X Black-doctors	-0.00025	-0.00003	0.00003	0.00137	-0.00081	0.0001
	(0.00034)	(0.00012)	(0.00003)	(0.00192)	(0.00128)	(0.00069)
R^2	0.075	0.101	0.065	0.233	0.286	0.132
Observations	15,394,168	15,394,168	15,394,168	15,394,168	11,049,262	11,053,559

*Note: This table presents the estimated heterogeneous racial effects of racial concordance on maternal and infant health outcomes, using data from 15,394,168 childbirths in Brazil between 2009 and 2019. It provides results for maternal and infant outcomes. Panel (A) includes maternal outcomes such as the probability of readmission within 30 days, ICU admission, maternal mortality, and labor/delivery complications. Panel (B) presents results for infant health outcomes, measured by Apgar scores at 1 and 5 minutes. Data sourced from Datasus-SIH and RAIS. The model controls for physician-year-hospital and weekday-month-hospital fixed effects, plus mother's race, age, and location. Control group means in brackets. Standard errors clustered at the hospital level. Significance levels follow the following pattern: *10%, **5%, ***1%*