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Ethnic and racial discrimination in maternal health care in Mexico: a neglected challenge in the search for universal health coverage

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Abstract

Background Ethnic and racial discrimination in maternal health care has been overlooked in academic literature and yet it is critical for achieving universal health coverage (UHC). There is a lack of empirical evidence on its impact on the effective coverage of maternal health interventions (ECMH) for Indigenous women in Mexico. Documenting progress in reducing maternal health inequities, particularly given the disproportionate impact of the Covid-19 pandemic on ethnic minorities, is essential to improving equity in health systems.

Methods We conducted a population-based, pooled cross-sectional, and retrospective analysis for 2009–2023, using data from the last three waves (2014, 2018, and 2023) of a nationally representative demographic survey (ENADID). Our study included $n = 72{,}873$ ($N = 23{,}245{,}468$) Mexican women aged 12–54 with recent live births. We defined ECMH as adequate antenatal care (ANC), skilled and/or institutional delivery care, timely postpartum care, and complication-free postpartum/puerperium. After describing sociodemographic characteristics and maternal health coverage by Indigenous status, we estimated a pooled fixed-effects multivariable regression model to adjust ECMH for relevant covariates. We used the Blinder-Oaxaca decomposition for nonlinear regression models to quantify inequities in ECMH due to ethnic-racial discrimination, defined as differences in outcomes attributable to differential treatment.

Findings Indigenous women had lower education, labor market participation, and socioeconomic position, higher parity, and more rural, poorer state residence than non-Indigenous women. They faced significant health coverage loss due to the dismantling of *Seguro Popular*, a public health insurance mechanism in place until the end of 2019, right before the start of the Covid pandemic. Adjusted ECMH was 25.3% for non-Indigenous women and 18.3% for Indigenous women, peaking at 28.8% and 21.2% in 2013–2018, declining to 25.7% and 18.7% pre-Covid (January 2019 to March 2020), and further declining to 24.0% and 17.4% during Covid, with an increase to 26.6% for non-Indigenous women post-Covid, while remaining similar for Indigenous women. Decomposition analyses revealed that during the analyzed period, 30.8% of the gap in ECMH was due to individual characteristics, 51.7% to ethnic-racial discrimination, and 17.5% to their interaction. From 2009 to 2012, 42.2% of the gap stemmed from observable differences, while 40.4% was due to discrimination. In the pre-Covid-19 phase, less than 1% was from observable characteristics, with 75.3% attributed to discrimination, which remained in the post-Covid-19 stage (78.7%).

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Conclusions Despite modest health policy successes, the ethnic gap in ECMH remains unchanged, indicating insufficient action against inequity-producing structures. Ethnic and racial discrimination persists, exacerbated during the pandemic and coinciding with the government's cancellation of targeted social programs and public health insurance focused on the poorest populations, including Indigenous peoples. Thus, prioritizing maternal and child health underscores the need for comprehensive policies, including specific anti-racist interventions. Addressing these inequities requires the recognition of both observable and unobservable factors driven by discriminatory ideologies and the implementation of targeted measures to confront the complex interactions driving discrimination in maternal health care services for Indigenous women.

Keywords Ethnic discrimination, Racism, Maternal health care, Equity, Universal health coverage, Mexico

Background

Social organization is a fundamental determinant of population health [1]. In Latin America and the Caribbean (LAC), deep forms of social stratification based on racist ideologies towards Indigenous populations persist, reinforcing and perpetuating their marginalization [2] and creating barriers to accessing healthcare, which significantly impacts their health status [3, 4]. Historically, however, most studies have focused on cultural differences to explain health inequalities such as higher maternal or infant mortality [3, 5, 6], thus invisibilizing the impact of ethnic and racial discrimination on life course outcomes, including health [7]. Few academic studies in LAC acknowledge the effects of this type of discrimination against Indigenous populations health system performance [3, 7, 8]. Most available evidence comes from qualitative case studies documenting discriminatory practices [9]. To our knowledge, there is limited research to measure ethnic discrimination within health systems [10].

Covid-19 has exacerbated health inequalities faced by Indigenous populations [11–13]. In particular, the pandemic contributed to increases in maternal mortality [14, 15] and other maternal and child health indicators such as antenatal care (ANC) [16]. Despite this, little attention has been paid to more comprehensive measures, such as effective coverage of maternal health interventions (ECMH) and their interaction with ethnic and racial discrimination. The disproportionately high burden of Covid-19 in minority communities reflects these existing health disparities and preexisting health disparities and systemic inequities [17, 18]. However, the extent to which these gaps in maternal care have been widened remains unclear.

In Mexico, according to the most recent 2020 Census, 6.1% of the population aged three years and older spoke an Indigenous language, representing approximately 7.4 million people [19]. These speakers belong to 68 linguistic groups and 364 linguistic variants distributed among 70 Indigenous Peoples. The states of Chiapas, Oaxaca, Mexico, Puebla, and Veracruz—some of the poorest in the country—concentrate over half (56.2%) of the Indigenous population [19]. These population groups experience marked inequalities in essential rights. For instance, in 2020, eight out of ten Indigenous people were not affiliated with any social health insurance. Most (87.5%) relied on publicly subsidized programs like the now-defunct *Seguro Popular* and *Progresa*, *Oportunidades-Prospera* (POP, for its acronym in Spanish) to access health services [19]. Furthermore, inequities in education are notable: 20% of Indigenous women and 11.8% of Indigenous men aged 15 and older were unable to read or write, compared to 4.1% and 3.1% among the non-Indigenous, respectively [19].

Our analysis tracks the temporal evolution of inequities and the impact of ethnic and racial discrimination on effective coverage in maternal healthcare (ECMH) in Mexico from 2009 to 2023, with particular emphasis on the Covid-19 pandemic period. Using data from the 2014, 2018, and 2023 National Survey of Demographic Dynamics (ENADID), which provides representative information at national and state levels, we examine disparities in ECMH—defined as adequate ANC, skilled and/or institutional delivery care, timely postpartum care, and postpartum/puerperium without complications—among 74,279 women aged 12–54, whose last pregnancy resulted in a stillbirth, live birth, or early infant death. The study explores pre- and post-Covid-19 periods, offering lessons for low- and middle-income countries in implementing post-pandemic health system reforms to achieve the Sustainable Development Goals (SDGs, Target 3) and Universal Health Coverage (UHC).

To assess differences in ECMH between Indigenous and non-Indigenous women, we drew from the labor economics literature and applied the Oaxaca-Blinder decomposition method. This method separates inequities into two components: differences in characteristics, such as educational attainment, and differences in how these characteristics affect healthcare access (e.g., the varying impact of education on health outcomes across groups). Our analysis is adjusted for individual, household, and contextual factors to uncover the underlying contributors to these healthcare inequities.

The study period covers three federal administrations with different party affiliations: 2006–2012, with the National Action Party (right-wing); 2012–2018, with

the Institutional Revolutionary Party (center-right); and 2018–2024, with the National Regeneration Movement (left) [20]. During this period, we identify two general approaches to social and health policies: continuity between 2006 and 2018 and a significant change from 2018 onwards [21, 22]. In social policy, the POP program was implemented between 1997 and November 2018—the first of its kind in the world to provide conditional cash transfers to incentivize school attendance, use of health services, and monitoring of children's nutrition [23, 24], with a focus on women's empowerment by allocating transfers to women and prioritizing girls education [24]. This program benefited over 6.8 million families until its abolition in December 2018 [25]. It was replaced by *Programas para el Bienestar*, which included cash transfers that were not conditional on using health services and, despite its focalization on marginalized groups, no longer privileged women's participation [22]. By 2024, 79% of Mexican households received benefits from at least one cash-transfer program [26].

Regarding access to healthcare, the first phase (2003–2019) focused on extending coverage through *Seguro Popular* (SP). This decentralized system offered public health insurance to the population without formal employment who had no access to social security health insurance [27] and prioritized maternal health [28]. As of December 2018, 82% of the population was covered by public health insurance [29]. In 2020, the government recentralized health services, abolished SP, and took over providing and financing health care for the population without formal employment [20]. Initially, this function was taken over by the *Instituto de Salud para el Bienestar* (INSABI) and, in 2023, by *IMSS-Bienestar* [20, 30].

Methods

Design and study population

We conducted a population-based, pooled cross-sectional, and retrospective analysis for 2009-23 using data from the 2014, 2018, and 2023 National Survey of Demographic Dynamics (ENADID) [31]. Conducted every five years between August and October, ENADID collects comprehensive data on demographic characteristics, maternal, newborn, and reproductive health, including contraceptive use and healthcare service utilization. It also provides updated information on fertility, mortality, reproductive preferences, nuptiality, internal and external migration, and insights into household and housing characteristics [31]. Based on a complex, multistage, and probabilistic sampling design, ENADID provides retrospective and population-based information representative at the national and state levels, including rural/urban stratification. Data were collected using a face-to-face household questionnaire [32, 33]. Across the three analyzed rounds, the survey included a total of 74,279 women aged 12–54 years at the time of their last delivery and whose most recent pregnancy resulted in a stillbirth, live birth, or the death of a child within the first year of life. For this study, we excluded women with private or mixed health insurance (5.1%) to focus on the population with significant Indigenous representation. After excluding an additional 2% of women with incomplete data on key variables such as ANC, delivery, or postpartum care, the final analytical sample comprised 72,873 women, representing nearly 24 million Mexican women when all survey rounds were combined.

Effective coverage in maternal healthcare

Based on our previous work [10, 34–36], we defined ECMH as the receipt of essential interventions across the continuum of maternal care [34], including adequate ANC, skilled or institutional delivery, timely postpartum care, and the absence of postpartum complications. Adequate ANC was defined as having at least five prenatal visits, the first occurring within the first twelve weeks, and the provision of at least 75% of recommended care processes based on national and international guidelines (e.g., administration of tetanus vaccine, testing for sexually transmitted diseases or abnormal blood glucose) [37–39]. Skilled delivery referred to childbirth attended by trained personnel and/or occurring in a health facility, while timely postpartum care was defined as a consultation within fifteen days of delivery. Postpartum complications were self-reported and included common maternal health issues such as excessive bleeding, high blood pressure, and infections.

Covariates

The primary independent variable was Indigenous status. The ENADID collects information related to language, which may overlook important cultural, social, and historical factors essential for fully understanding Indigenous groups. Nevertheless, this Indigenous identification criterion, although limited, allowed us to make three assumptions. First, women who speak primarily an Indigenous language self-identify as Indigenous. Second, they face similar barriers to healthcare access that could affect their utilization and timely receipt of the continuum of care [40–42]. Third, speaking an Indigenous language is a proxy for occupying a similar position in a stratified social structure based on ethnic identity criteria. Accordingly, we classified women as Indigenous if they reported speaking an Indigenous language; 7.6% fell into this category, representing 1.7 million women aged 12–54 years at the time of their last delivery during the study period.

We also recovered several individual, household, and contextual factors. (i) *At the individual level*: age at the time of last birth (12–19, 20–29, 30–39, and 40–54), the period of the last obstetric event, based on the month and

year (2009–12, 2013–18, and the pre-Covid ——January 2019 to March 2020——, Covid ——April 2020 to March 2022——, and post-Covid ——April 2022 to October 2023). These cut-off dates were informed by the evolution of Covid-19 waves, considering trends in infections, hospitalizations, and mortality reported by Mexico's health authorities [43] and their implications for healthcare service utilization. Specifically, Mexico's fourth Covid-19 wave, which began in April 2022, marked a de facto return to normality in healthcare service delivery); head of household status (yes = 1/no = 0); marital status (single, married or in union, and divorced, separated, or widowed); schooling level (none/elementary, middle, high or bachelor's/higher school) whether the respondent was recently employed; health insurance coverage at the time of the survey —none, Social Security, or *Seguro Popular/INSABI* (a single category, as *INSABI* took over the population without social security in 2020 [30, 44])—; obstetric information including parity (primiparous, one, two, or three or more); history of perinatal losses (stillbirth or death within the first year of life or at least one miscarriage or abortion), and the diagnosis of a health problem during pregnancy or childbirth. (ii) *At the household level*: a factorial asset and housing material index as a measure of socioeconomic status [45–47]. The index categorized women into five groups (from lowest to highest) using the Dalenius and Hodges method [48], where higher categories indicate more assets and better housing conditions. (iii) *At the place of residence levels*: the area of residence by population size (rural: <2500 inhabitants, urban: 2,500 – 100,000, and metropolitan: >100,000), as well as the socioeconomic region of residence according to the official Mexican definition [49].

Analysis

Considering the complex survey design, all statistical analyses were conducted using Stata MP v17.1 [50]. First, we summarized the sociodemographic, sexual, and reproductive characteristics of our study population using descriptive statistics (expressed as percentages and 95% confidence intervals, CI) according to Indigenous status and the index of last delivery (2009–12, 2013–18, pre-Covid, Covid and post-Covid). We then estimated unadjusted and conditional coverage rates for each dimension of ECMH independently. Independent coverage was the percentage of the population receiving each healthcare intervention, while ECMH refers to full compliance with these healthcare interventions. Third, we adjusted the ECMH rate by Indigenous status for the pre-post Covid-19 period using a pooled fixed-effects logistic regression [51]. This model included all previously mentioned covariates, including the last delivery period and socioeconomic region dummy variables. Specification and goodness-of-fit were assessed using the Hosmer-Lemeshow and link tests [52].

Finally, to analyze ethnic inequities in ECMH attributable to ethnoracial discrimination, we implemented the adapted version of the Blinder-Oaxaca (BO) decomposition technique for nonlinear regression models [53, 54]. This method allows for a ceteris paribus breakdown of the outcome difference between two groups into three components: endowment (explained by group characteristics), coefficient (differences in returns to characteristics), and interaction (the combined effect of both).

Let $E[ECMH_i|X_i] = g(X_i\beta)$ be the expected outcome for individual *i* given characteristics X_i, where $g(\cdot)$ is a nonlinear link function (in our case, logistic), and β is a vector of coefficients. If separate regression models for (ind) and $(\bar{ind})$ are fit, it is possible to separate the total gap in ECMH into three quantities:

i) The *endowments component* reflects the part of the outcome difference due to differences in the characteristics X between the two groups (Indigenous (ind) and non-Indigenous $(\bar{ind})$), holding the regression coefficients constant ($[g(X_{ind}\beta_{\bar{ind}}) - g(X_{\bar{ind}}\beta_{\bar{ind}})]$). This component tells us how much of the outcome difference can be explained by the different characteristics between groups ind and $\bar{ind}$, using the coefficients from the least disadvantaged group ($\bar{ind}$).

ii) The *coefficients component* captures the part of the outcome difference due to differences in the coefficients β between the two groups, holding the characteristics constant ($[g(X_{ind}\beta_{ind}) - g(X_{ind}\beta_{\bar{ind}})]$). This component represents the structural differences between the two groups and may include factors like discrimination or unobserved variables. It reflects how the same characteristics are "valued" differently between groups ind and $\bar{ind}$.

iii) The *interaction component* accounts for the differences in characteristics and coefficients. This means the impact of the difference in characteristics could change depending on the differences in coefficients, and vice versa ($[g(X_{ind}\beta_{ind}) - g(X_{\bar{ind}}\beta_{ind}) - g(X_{ind}\beta_{\bar{ind}}) - g(X_{\bar{ind}}\beta_{\bar{ind}})]$). This component represents the combined effect of having different characteristics and coefficients across the two groups. Thus, the total outcome difference between both groups ind and $\bar{ind}$ can be expressed as:

Table 1 Main characteristics of Mexican women studied by indigenous status, 2009–2023

	Estimated percentage of weighted population (95% CI)											
	Overall		2009–2012		2013–2018		Pre-Covid-19[a]		Covid-19[b]		Post-Covid-19[c]	
	Non-Indigenous	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous	Indigenous	Non-Indigenous	Indigenous
N	21,513,681	1,731,787	5,045,725	365,820	11,063,753	875,119	1,286,649	98,781	2,352,354	225,568	1,764,220	167,478
%	92.6	7.5	93.2	6.8	92.7	7.3	92.9	7.1	91.3	8.8	91.3	8.7
Age at time of last delivery birth, years												
12——19	15.7 [15.3, 16.1]	13.9 [12.8, 15.1]	14.8 [14.1, 15.6]	11.6 [9.6, 13.6]	17.0 [16.4, 17.5]	15.3 [13.7, 16.9]	13.7 [12.1, 15.2]	12.8 [8.3, 17.3]	13.8 [12.7, 15.0]	11.7 [8.8, 14.5]	14.4 [13.1, 15.6]	15.7 [11.9, 19.5]
20——29	53.6 [53.0, 54.1]	51.0 [49.4, 52.7]	53.1 [52.1, 54.2]	53.6 [49.9, 57.3]	53.6 [52.9, 54.3]	51.6 [49.4, 53.8]	52.5 [50.3, 54.6]	46.8 [39.7, 53.8]	53.8 [52.1, 55.4]	48.1 [43.3, 52.9]	54.8 [52.9, 56.6]	49.0 [44.0, 54.0]
30——39	28.0 [27.5, 28.4]	30.9 [29.2, 32.6]	29.4 [28.4, 30.4]	30.8 [27.3, 34.4]	26.7 [26.1, 27.4]	29.4 [27.1, 31.8]	30.8 [28.8, 32.8]	33.3 [26.5, 40.2]	28.9 [27.4, 30.4]	35.8 [30.7, 40.9]	28.4 [26.7, 30.1]	31.1 [26.7, 35.6]
40——54	2.8 [2.6, 2.9]	4.1 [3.4, 4.8]	2.7 [2.3, 3.0]	4.0 [2.5, 5.4]	2.7 [2.5, 2.9]	3.7 [2.8, 4.6]	3.0 [2.3, 3.7]	7.1 [3.7, 10.5]	3.5 [2.9, 4.1]	4.4 [2.3, 6.6]	2.5 [1.9, 3.2]	4.2 [2.1, 6.3]
Head of household	10.1 [9.7, 10.4]	9.9 [8.8, 10.9]	9.6 [9.0, 10.1]	11.9 [9.6, 14.3]	9.4 [9.0, 9.8]	8.1 [6.9, 9.2]	13.9 [12.5, 15.4]	17.1 [11.4, 22.8]	13.1 [12.0, 14.2]	12.7 [9.1, 16.2]	8.7 [7.7, 9.7]	6.6 [4.0, 9.1]
Marital status												
Single	8.3 [8.0, 8.6]	4.1 [3.4, 4.7]	8.4 [7.8, 9.0]	4.5 [3.1, 5.9]	8.3 [7.9, 8.8]	3.9 [3.1, 4.7]	8.8 [7.5, 10.1]	4.0 [1.6, 6.5]	8.1 [7.2, 9.1]	4.4 [2.2, 6.6]	7.3 [6.3, 8.4]	3.4 [1.2, 5.7]
Married/free union	81.0 [80.6, 81.5]	89.6 [88.7, 90.6]	80.9 [80.0, 81.7]	88.7 [86.6, 90.8]	81.4 [80.8, 82.0]	90.9 [89.6, 92.1]	75.5 [73.6, 77.4]	86.7 [82.2, 91.1]	80.0 [78.6, 81.3]	86.6 [83.2, 90.1]	84.8 [83.4, 86.1]	90.9 [87.9, 94.0]
Divorced/separated/widowed	10.7 [10.4, 11.0]	6.3 [5.6, 7.1]	10.8 [10.1, 11.4]	6.8 [5.2, 8.5]	10.2 [9.8, 10.7]	5.2 [4.3, 6.2]	15.7 [14.1, 17.3]	9.3 [5.5, 13.0]	11.9 [10.9, 13.0]	9.0 [6.2, 11.7]	7.9 [7.0, 8.8]	5.6 [3.3, 7.9]
Schooling, years												
0——6 (none/elementary school)	15.4 [15.0, 15.9]	44.9 [42.6, 47.2]	21.2 [20.3, 22.1]	56.4 [51.7, 61.1]	15.0 [14.4, 15.6]	46.4 [43.3, 49.5]	11.9 [10.4, 13.3]	35.8 [28.9, 42.7]	10.8 [9.7, 11.8]	32.9 [28.4, 37.5]	10.3 [9.0, 11.5]	33.2 [27.7, 38.7]

Table 1 (continued)

	Estimated percentage of weighted population (95% CI)											
	Overall		**2009–2012**		**2013–2018**		**Pre-Covid-19[a]**		**Covid-19[b]**		**Post-Covid-19[c]**	
	Non-Indigenous	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**
7——9 (middle school)	37.7 [37.1, 38.2]	36.3 [34.4, 38.2]	38.2 [37.1, 39.2]	29.9 [25.7, 34.2]	38.3 [37.6, 39.0]	35.2 [32.7, 37.8]	36.3 [34.2, 38.4]	40.8 [34.4, 47.3]	36.5 [34.9, 38.1]	44.1 [40.0, 48.1]	35.1 [33.2, 36.9]	42.6 [36.9, 48.3]
10——12 (high school)	28.1 [27.6, 28.6]	14.3 [12.9, 15.6]	23.9 [23.0, 24.9]	9.6 [7.3, 11.9]	28.2 [27.5, 28.8]	14.2 [12.3, 16.1]	30.0 [27.9, 32.2]	16.4 [11.2, 21.6]	31.7 [30.2, 33.3]	18.1 [14.6, 21.7]	33.1 [31.2, 34.9]	18.4 [14.3, 22.5]
13——24 (bachelor's or higher)	18.8 [18.4, 19.3]	4.5 [3.8, 5.3]	16.7 [15.9, 17.5]	4.0 [2.6, 5.5]	18.6 [18.0, 19.2]	4.2 [3.1, 5.2]	21.8 [20.0, 23.7]	7.0 [3.9, 10.2]	21.0 [19.6, 22.3]	4.8 [3.1, 6.6]	21.6 [19.9, 23.2]	5.8 [3.0, 8.5]
Employed in the last week	40.4 [39.8, 40.9]	27.9 [26.1, 29.6]	40.4 [39.3, 41.5]	29.4 [26.1, 32.7]	38.6 [37.9, 39.4]	23.9 [21.6, 26.2]	53.3 [51.0, 55.5]	37.1 [30.5, 43.8]	46.3 [44.7, 48.0]	38.7 [34.0, 43.4]	34.1 [32.3, 35.9]	25.3 [20.1, 30.4]
Health insurance												
None	22.5 [21.9, 23.0]	23.0 [21.0, 25.0]	16.0 [15.2, 16.9]	11.7 [9.2, 14.2]	16.2 [15.6, 16.8]	14.3 [12.4, 16.3]	40.3 [38.0, 42.6]	44.7 [37.2, 52.3]	41.8 [40.0, 43.5]	47.6 [42.3, 52.8]	41.2 [39.2, 43.2]	47.1 [41.3, 53.0]
Seguro Popular/ INSABI[d]	42.8 [42.1, 43.4]	68.4 [66.2, 70.6]	49.7 [48.5, 50.9]	80.8 [77.8, 83.8]	49.5 [48.6, 50.3]	77.4 [75.0, 79.8]	20.8 [19.0, 22.5]	41.3 [33.8, 48.8]	21.9 [20.5, 23.2]	43.7 [38.6, 48.9]	24.8 [23.1, 26.4]	43.3 [37.4, 49.3]
Social Security	34.8 [34.2, 35.4]	8.6 [7.6, 9.6]	34.3 [33.2, 35.4]	7.5 [5.7, 9.3]	34.3 [33.5, 35.1]	8.3 [6.9, 9.6]	38.9 [36.7, 41.1]	14.0 [9.4, 18.6]	36.4 [34.7, 38.0]	8.7 [5.7, 11.7]	34.0 [32.2, 35.9]	9.6 [6.0, 13.1]
Parity at time of last delivery birth												
Primiparous	35.8 [35.3, 36.4]	28.4 [26.7, 30.0]	32.4 [31.5, 33.4]	25.1 [21.9, 28.3]	37.0 [36.3, 37.7]	28.8 [26.5, 31.2]	35.7 [33.5, 37.8]	29.7 [23.6, 35.7]	35.3 [33.8, 36.9]	28.6 [24.2, 33.0]	39.0 [37.2, 40.8]	32.0 [26.9, 37.1]
One	32.7 [32.2, 33.2]	27.2 [25.7, 28.7]	32.4 [31.4, 33.4]	26.4 [23.3, 29.5]	32.5 [31.8, 33.1]	26.4 [24.5, 28.4]	34.2 [32.1, 36.3]	27.1 [20.6, 33.6]	33.4 [31.8, 34.9]	29.8 [25.4, 34.2]	33.4 [31.6, 35.2]	29.8 [24.7, 34.9]
Two	20.3 [19.9, 20.7]	18.5 [17.2, 19.8]	21.3 [20.5, 22.2]	17.5 [15.0, 20.1]	19.8 [19.3, 20.4]	18.2 [16.4, 20.1]	20.5 [18.7, 22.2]	20.4 [15.1, 25.7]	21.5 [20.1, 22.9]	19.9 [15.9, 23.9]	18.3 [16.9, 19.7]	19.0 [14.6, 23.3]

Table 1 (continued)

	Estimated percentage of weighted population (95% CI)											
	Overall		**2009–2012**		**2013–2018**		**Pre-Covid-19[a]**		**Covid-19[b]**		**Post-Covid-19[c]**	
	Non-Indigenous	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**
Three or over	11.1 [10.8, 11.5]	25.9 [24.3, 27.6]	13.8 [13.1, 14.6]	31.0 [27.7, 34.3]	10.7 [10.2, 11.1]	26.5 [24.2, 28.9]	9.7 [8.5, 10.9]	22.8 [16.6, 29.1]	9.8 [8.8, 10.7]	21.7 [17.3, 26.2]	9.3 [8.3, 10.3]	19.2 [14.7, 23.8]
Perinatal losses[e]	15.5 [15.1, 15.9]	11.4 [10.3, 12.4]	14.9 [14.2, 15.7]	12.5 [10.2, 14.8]	15.1 [14.6, 15.6]	10.7 [9.4, 12.0]	16.1 [14.5, 17.7]	10.9 [6.9, 14.8]	16.5 [15.3, 17.6]	10.3 [7.7, 13.0]	17.8 [16.4, 19.2]	14.1 [10.3, 18.0]
Health problem diagnosed during pregnancy												
None	33.7 [33.2, 34.2]	49.4 [47.4, 51.4]	36.5 [35.4, 37.6]	52.4 [48.5, 56.2]	32.9 [32.2, 33.6]	51.3 [48.7, 53.9]	34.0 [32.0, 36.1]	42.1 [35.1, 49.2]	34.0 [32.4, 35.6]	44.2 [39.0, 49.4]	30.0 [28.2, 31.9]	44.1 [37.9, 50.3]
One	26.4 [25.9, 26.9]	23.0 [21.6, 24.4]	26.2 [25.2, 27.1]	21.1 [18.4, 23.8]	26.8 [26.1, 27.4]	23.3 [21.4, 25.3]	25.6 [23.7, 27.5]	27.5 [21.3, 33.8]	26.5 [25.0, 27.9]	22.7 [18.9, 26.6]	25.0 [23.4, 26.6]	23.0 [18.0, 28.0]
Two	18.3 [17.9, 18.7]	12.8 [11.7, 14.0]	17.6 [16.7, 18.4]	13.0 [10.6, 15.4]	18.7 [18.1, 19.2]	11.7 [10.3, 13.2]	18.3 [16.8, 19.9]	12.4 [7.8, 17.0]	17.4 [16.2, 18.6]	16.8 [13.3, 20.4]	19.5 [17.9, 21.0]	13.2 [9.4, 17.0]
Three or over	21.6 [21.1, 22.0]	14.8 [13.6, 16.1]	19.8 [18.9, 20.6]	13.5 [11.2, 15.9]	21.6 [21.0, 22.2]	13.7 [12.0, 15.3]	22.0 [20.1, 23.9]	17.9 [12.8, 23.0]	22.1 [20.8, 23.4]	16.2 [12.5, 19.9]	25.5 [23.9, 27.2]	19.8 [15.1, 24.4]
Health problem diagnosed during childbirth												
None	61.2 [60.7, 61.7]	62.9 [61.1, 64.8]	63.3 [62.2, 64.4]	67.7 [64.3, 71.1]	60.7 [60.0, 61.4]	64.7 [62.2, 67.1]	61.1 [59.0, 63.2]	54.7 [47.5, 61.9]	61.0 [59.4, 62.6]	57.6 [52.6, 62.5]	58.7 [56.9, 60.6]	55.6 [49.9, 61.2]
One	24.9 [24.5, 25.4]	23.0 [21.5, 24.4]	23.6 [22.7, 24.4]	20.4 [17.7, 23.2]	25.0 [24.4, 25.7]	22.6 [20.5, 24.7]	25.1 [23.2, 27.0]	26.3 [20.3, 32.3]	25.2 [23.8, 26.6]	24.8 [21.0, 28.6]	27.5 [25.9, 29.2]	25.7 [21.0, 30.5]

Table 1 (continued)

	Estimated percentage of weighted population (95% CI)											
	Overall		**2009–2012**		**2013–2018**		**Pre-Covid-19[a]**		**Covid-19[b]**		**Post-Covid-19[c]**	
	Non-Indigenous	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**
Two	9.1 [8.8, 9.4]	9.0 [8.0, 10.1]	8.4 [7.9, 9.0]	7.8 [5.9, 9.7]	9.3 [8.9, 9.7]	8.2 [6.9, 9.5]	10.1 [8.8, 11.3]	12.9 [8.3, 17.4]	9.1 [8.1, 10.1]	11.3 [8.1, 14.6]	9.2 [8.1, 10.4]	10.8 [6.6, 15.0]
Three or over	4.8 [4.5, 5.0]	5.1 [4.3, 5.8]	4.7 [4.2, 5.3]	4.1 [2.8, 5.3]	5.0 [4.7, 5.3]	4.5 [3.6, 5.4]	3.8 [3.1, 4.5]	6.1 [2.4, 9.9]	4.6 [4.0, 5.3]	6.3 [3.5, 9.1]	4.5 [3.7, 5.3]	7.9 [5.0, 10.7]
Socioeconomic level												
Lowest	5.9 [5.5, 6.2]	40.4 [38.0, 42.8]	6.9 [6.3, 7.6]	47.6 [42.9, 52.3]	6.3 [5.8, 6.7]	42.1 [38.9, 45.2]	3.4 [2.3, 4.4]	26.9 [20.9, 32.9]	4.3 [3.6, 5.1]	33.1 [27.9, 38.2]	4.5 [3.6, 5.3]	33.5 [27.9, 39.2]
Low	16.2 [15.8, 16.7]	32.0 [30.3, 33.7]	19.3 [18.3, 20.3]	29.2 [25.6, 32.7]	16.5 [15.8, 17.1]	31.0 [28.7, 33.4]	12.4 [10.9, 13.8]	37.9 [31.3, 44.6]	13.5 [12.2, 14.7]	32.9 [28.5, 37.4]	12.4 [11.1, 13.7]	37.9 [32.6, 43.3]
Middle	19.6 [19.1, 20.0]	14.8 [13.5, 16.1]	21.8 [20.9, 22.7]	14.7 [11.8, 17.6]	19.6 [19.0, 20.2]	13.9 [12.2, 15.6]	17.1 [15.4, 18.7]	16.7 [11.9, 21.6]	17.6 [16.3, 18.8]	17.8 [14.1, 21.6]	17.4 [16.0, 18.9]	14.1 [10.5, 17.8]
High	26.2 [25.7, 26.8]	8.5 [7.5, 9.6]	26.8 [25.8, 27.8]	5.6 [4.2, 7.0]	26.2 [25.5, 26.9]	8.6 [7.2, 10.0]	26.2 [24.3, 28.2]	9.6 [5.5, 13.8]	25.5 [24.1, 26.9]	12.0 [8.5, 15.5]	26.1 [24.5, 27.8]	9.5 [6.4, 12.5]
Highest	32.1 [31.5, 32.6]	4.3 [3.6, 5.0]	25.2 [24.2, 26.2]	2.9 [1.8, 4.0]	31.5 [30.7, 32.3]	4.4 [3.4, 5.4]	41.0 [38.7, 43.2]	8.8 [5.2, 12.5]	39.1 [37.4, 40.8]	4.1 [2.2, 6.0]	39.6 [37.6, 41.6]	5.0 [2.4, 7.5]
Area of residence												
Rural	26.8 [25.9, 27.6]	61.2 [58.0, 64.3]	24.4 [23.4, 25.4]	58.2 [53.0, 63.4]	26.3 [25.2, 27.5]	61.7 [57.5, 65.8]	28.9 [26.3, 31.5]	58.3 [50.3, 66.4]	29.9 [27.8, 32.0]	64.3 [57.7, 70.9]	30.6 [28.3, 33.0]	62.5 [55.1, 69.9]
Urban	31.7 [30.9, 32.5]	26.3 [23.4, 29.2]	31.8 [30.8, 32.8]	29.7 [24.8, 34.5]	31.4 [30.2, 32.5]	25.2 [21.3, 29.2]	32.5 [30.0, 35.0]	27.2 [20.2, 34.2]	32.5 [30.3, 34.6]	25.0 [19.0, 31.0]	31.9 [29.5, 34.2]	25.9 [19.4, 32.4]
Metropolitan	41.5 [40.8, 42.3]	12.5 [11.0, 14.0]	43.8 [42.8, 44.8]	12.2 [9.6, 14.7]	42.3 [41.2, 43.4]	13.1 [11.0, 15.1]	38.6 [36.1, 41.0]	14.4 [9.1, 19.8]	37.7 [35.7, 39.6]	10.7 [7.1, 14.3]	37.5 [35.3, 39.7]	11.6 [7.3, 16.0]
Economic Region												

Table 1 (continued)

	Estimated percentage of weighted population (95% CI)											
	Overall		**2009–2012**		**2013–2018**		**Pre-Covid-19[a]**		**Covid-19[b]**		**Post-Covid-19[c]**	
	Non-Indigenous	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**	**Indigenous**
Lowest	10.1 [9.6, 10.7]	43.8 [40.3, 47.3]	9.2 [8.6, 9.8]	39.2 [33.9, 44.6]	10.1 [9.4, 10.8]	44.5 [40.0, 49.0]	10.7 [9.3, 12.1]	41.4 [32.9, 49.9]	11.1 [9.8, 12.4]	45.4 [38.0, 52.8]	11.4 [9.9, 12.9]	49.0 [40.8, 57.2]
2nd	19.5 [18.9, 20.2]	26.3 [23.3, 29.3]	19.6 [18.8, 20.4]	31.3 [25.9, 36.8]	19.8 [18.9, 20.8]	25.7 [22.0, 29.4]	19.4 [17.4, 21.3]	26.5 [18.8, 34.1]	19.2 [17.6, 20.9]	23.3 [17.6, 29.0]	18.4 [16.5, 20.3]	22.4 [16.2, 28.7]
3rd	15.1 [14.5, 15.7]	3.8 [2.2, 5.4]	14.6 [14.0, 15.2]	3.6 [1.5, 5.6]	15.0 [14.2, 15.8]	2.7 [1.4, 3.9]	16.0 [14.2, 17.7]	5.6 [1.5, 9.7]	15.4 [13.9, 16.8]	6.2 [1.8, 10.6]	16.1 [14.5, 17.7]	5.9 [1.0, 10.7]
4th	23.8 [22.9, 24.6]	18.2 [15.8, 20.6]	24.7 [23.7, 25.8]	19.0 [15.2, 22.7]	23.7 [22.5, 24.9]	19.1 [15.5, 22.6]	23.6 [20.9, 26.4]	14.3 [9.5, 19.2]	23.1 [20.9, 25.4]	16.9 [11.8, 22.0]	22.5 [20.2, 24.9]	16.1 [11.1, 21.2]
5th	11.5 [11.2, 11.9]	3.9 [3.1, 4.7]	11.8 [11.3, 12.3]	4.3 [2.9, 5.7]	11.5 [11.0, 12.1]	3.7 [2.6, 4.7]	11.4 [10.1, 12.7]	4.6 [2.0, 7.3]	11.6 [10.6, 12.7]	4.1 [2.1, 6.1]	11.1 [9.9, 12.3]	3.2 [1.3, 5.1]
Highest	19.9 [19.3, 20.5]	4.1 [3.2, 4.9]	20.2 [19.4, 20.9]	2.6 [1.4, 3.9]	19.9 [19.0, 20.7]	4.4 [3.3, 5.5]	18.9 [16.9, 20.9]	7.6 [3.2, 11.9]	19.6 [17.9, 21.2]	4.1 [1.9, 6.4]	20.4 [18.5, 22.4]	3.3 [0.9, 5.7]

[a]Pre-Covid-19 period: Jan 2019 to Mar 2020; [b]Covid-19 period: Apr 2020 to Mar 2022; [c]post-Covid-19 period: Apr 2022 to Oct 2023. [d]The Seguro Popular de Salud operated from 2004 until 2019. This programme was cancelled by the current government in 2019 and replaced by the Instituto de Salud para el Bienestar (or INSABI). [e]Stillbirth or death within the first year of life or at least one miscarriage or abortion

$$
\begin{aligned}
\Delta &= \left[g(X_{ind}\beta_{ind}) - g(X_{\_ind}\beta_{\_ind}) \right] \\
&= \left[g(X_{ind}\beta_{\_ind}) - g(X_{\_ind}\beta_{\_ind}) \right] \\
&+ \left[g(X_{ind}\beta_{ind}) - g(X_{ind}\beta_{\_ind}) \right] \\
&+ \left[g(X_{ind}\beta_{ind}) - g(X_{\_ind}\beta_{ind}) \right] \\
&- \left[g(X_{ind}\beta_{\_ind}) - g(X_{\_ind}\beta_{\_ind}) \right]
\end{aligned}
$$

The decomposition analysis used Stata's *nldecompose* command [53], with standard errors calculated via Bootstrap with 1,000 replications with replacement. Sensitivity analyses incorporated interaction terms between Indigenous status and several key variables to identify potential effect modifiers and reinforce robustness through the estimation of additive models.

Our research did not require approval from the ethics committees of our institutions, as it was based solely on publicly available secondary data. All study materials are available at https://www.inegi.org.mx/programas/enadid.

Results

In the fifteen years of the analysis, the percentage of Indigenous women grew almost 29%, from 6.8% in 2009-12 to 7.3% in the pre-Covid-19 stage and to 8.8% during the pandemic (Table 1). Indigenous women (vs. non-Indigenous women) recorded older age at the time of their last pregnancy (35% vs. 30.8% aged 30–54 years), were more likely to be married (89.6% vs. 81%), had lower educational attainment (44.9% with elementary or no schooling vs. 15.4%)—although this percentage decreased notably from 56.4% vs. 21.2% in 2009-12 to 33.2% vs. 10.3% during the post-Covid-19—stage, and had lower participation in the labor market (27.9% vs. 40.4%). The percentage of Indigenous women without any health insurance grew 302% (vs. 157% among non-Indigenous women) during the period of analysis, from 11.7% (vs. 16%) in 2009-12 to 44.7 (40.3%) in the pre-Covid-19 stage (the period when SP disappeared) and to 47.1% (41.2%) in the post-Covid-19 stage. The percentage of Indigenous women who reported having three or more children at the time of their last obstetric event was also consistently higher (25.9% vs. 11.1%), with a clear downward trend going from 31% in 2009-12 to 19.2% in the last period. Among Indigenous women, self-reported perinatal loss was less frequent (11.4% vs. 15.5%), while reports of health issues detected during pregnancy were more common (49.4% vs. 33.7%), and similar frequency of reported health issues during childbirth across groups (62%). A higher percentage of Indigenous women reported residing in very low socioeconomic housing (40.4% vs. 5.9%), in rural communities (61.2% vs. 26.8%), and in more socially deprived communities (43.8% vs. 10.1%).

The crude and independent coverage of adequate ANC in Indigenous women was 76.6%, 11% points lower than that of non-Indigenous women (87.4%) (Table 2-Panel A). These estimates were similar across analysis periods, with the most significant gaps in timely (70.6% vs. 82.4%) and frequent (84.4% vs. 93.5%) prenatal care. However, improvements were observed mainly in the timeliness of prenatal care. In contrast, while receipt of skilled and institutional ANC remained around 98% among non-Indigenous women, such coverage dropped from 92% before the disappearance of SP to 84.6% in the post-Covid-19 stage among Indigenous women. Coverage of skilled and institutional delivery care and timely postpartum care were also persistently lower among Indigenous women (80.1% vs. 98.2% and 59.9% vs. 65.2%, respectively). In particular, coverage of timely postpartum care among non-Indigenous women decreased from 66.4% in 2009-12 to 59.9% in the pre-Covid-19 stage and 57.7% during the pandemic, and then recovered to 62.3% after the pandemic, while among Indigenous women, coverage dropped significantly with the disappearance of SP, from 62.9% in 2009-12 to 61.2% before the disappearance of SP insurance, to 53.6% in the post-Covid-19 stage. With respect to postpartum complications, we found higher rates among Indigenous women (78% vs. 71.1%).

The unadjusted percentage of women who received all maternal health interventions and did not present postpartum complications or ECMH was 28.6% lower among Indigenous women (24.3% vs. 33.9%), a difference that was maintained throughout the study period (Table 2-Panel B). Timely ANC with adequate content, institutional and skilled delivery care, and timely postpartum care were the main bottlenecks in the continuum of care.

Figure 1 presents the results of the estimated multiple logistic regression model for ECMH. Over the fifteen years of analysis, Indigenous women, compared to non-Indigenous, had lower ECMH (26.5%, 95%CI: 24.8%, 28.2% vs. 32.8%, 95%CI: 32.4%, 33.3%). In both groups, the highest level of ECMH was reached during the period 2013-18— right before the disappearance of SP (28.2%, 95%CI: 26.4%, 30.0% vs. 34.8%, 95%CI: 34.2%, 35.5%), only to decline during the pandemic among more Indigenous women (23. 8%, 95%CI: 21.9%, 25.8% vs. 29.9%, 95%CI: 28.4%, 31.4%); it remained unchanged for Indigenous women and bounced back to pre-Covid-19 levels for non-Indigenous women (25.9%, 95%CI: 23.7, 28.1% vs. 32.2%, 95%CI: 30.5, 33.9%).

Table 3 shows the results of BO's non-linear decomposition of the ethnic and racial inequity in the ECMH. Throughout the analysis period, 30.8% of the gap in ECMH was attributed to observable characteristics, 51.7% to discrimination against Indigenous women, and

Table 2 Pre-post-Covid-19 crude effective coverage of maternal health care components by indigenous status

	Estimated percentage of weighted population [95% CI]					
	Overall	**2009–2012**	**2013–2018**	**Pre-Covid-19[a]**	**Covid-19[b]**	**Post-Covid-19[c]**
	23,245,468 (100.0%)	**5,411,545 (23.3%)**	**11,938,872 (51.4%)**	**1,385,430 (6.0%)**	**2,577,922 (11.1%)**	**1,931,698 (8.3%)**
Panel A. Independent						
Antenatal care						
Skilled and/or institutional						
Non-Indigenous	98.6 [98.5, 98.8]	98.9 [98.7, 99.1]	98.7 [98.5, 98.9]	98.6 [98.0, 99.1]	98.2 [97.7, 98.6]	98.1 [97.6, 98.6]
Indigenous	89.7 [88.2, 91.1]	90.6 [88.0, 93.1]	90.5 [88.7, 92.3]	92.0 [87.5, 96.5]	87.7 [84.1, 91.4]	84.6 [79.8, 89.3]
Timely						
Non-Indigenous	82.4 [82.0, 82.8]	73.0 [72.0, 74.0]	83.8 [83.2, 84.3]	89.7 [88.3, 91.1]	88.3 [87.3, 89.4]	88.0 [86.8, 89.3]
Indigenous	70.6 [68.8, 72.5]	59.0 [54.9, 63.1]	72.5 [70.1, 74.8]	81.4 [75.9, 87.0]	75.6 [70.6, 80.6]	73.3 [68.1, 78.4]
Frequent						
Non-Indigenous	93.5 [93.2, 93.7]	93.9 [93.4, 94.4]	93.6 [93.2, 93.9]	93.7 [92.6, 94.8]	92.6 [91.8, 93.5]	92.6 [91.5, 93.7]
Indigenous	84.4 [82.8, 86.0]	86.0 [83.3, 88.7]	84.7 [82.5, 86.9]	88.3 [83.5, 93.2]	80.5 [75.9, 85.1]	82.4 [78.3, 86.5]
Adequate						
Non-Indigenous	87.4 [87.0, 87.8]	85.8 [85.0, 86.5]	88.0 [87.5, 88.5]	88.4 [87.1, 89.8]	86.6 [85.5, 87.7]	88.5 [87.3, 89.8]
Indigenous	76.6 [74.5, 78.6]	74.3 [70.6, 78.0]	78.3 [75.6, 81.0]	71.6 [65.1, 78.1]	75.1 [70.2, 80.0]	77.3 [72.3, 82.4]
Skilled delivery						
Non-Indigenous	98.2 [98.0, 98.4]	97.7 [97.3, 98.1]	98.3 [98.1, 98.5]	98.8 [98.3, 99.3]	98.3 [97.9, 98.7]	98.5 [98.1, 99.0]
Indigenous	80.1 [77.7, 82.6]	77.1 [72.7, 81.5]	79.9 [76.8, 83.0]	84.8 [78.6, 91.0]	83.1 [78.5, 87.6]	81.4 [75.8, 87.1]
Timely postpartum care						
Non-Indigenous	65.2 [64.6, 65.7]	66.4 [65.3, 67.4]	67.3 [66.5, 68.0]	59.9 [57.7, 62.0]	57.7 [56.1, 59.3]	62.3 [60.5, 64.2]
Indigenous	59.9 [58.0, 61.8]	62.9 [59.2, 66.7]	61.2 [58.5, 63.8]	61.1 [53.4, 68.7]	54.4 [49.7, 59.2]	53.6 [47.9, 59.3]
Complication-free postpartum						
Non-Indigenous	71.1 [70.6, 71.6]	73.3 [72.3, 74.3]	70.4 [69.8, 71.1]	71.3 [69.3, 73.4]	70.8 [69.3, 72.3]	68.9 [67.1, 70.6]
Indigenous	78.0 [76.6, 79.4]	78.5 [75.7, 81.4]	78.0 [76.1, 80.0]	76.1 [70.3, 81.9]	76.5 [71.6, 81.3]	79.8 [75.2, 84.4]
Panel B. Conditional						
Antenatal care						
Skilled and/or institutional						
Non-Indigenous	98.6 [98.5, 98.8]	98.9 [98.7, 99.1]	98.7 [98.5, 98.9]	98.6 [98.0, 99.1]	98.2 [97.7, 98.6]	98.1 [97.6, 98.6]
Indigenous	89.7 [88.2, 91.1]	90.6 [88.0, 93.1]	90.5 [88.7, 92.3]	92.0 [87.5, 96.5]	87.7 [84.1, 91.4]	84.6 [79.8, 89.3]
(+) Timely						
Non-Indigenous	82.1 [81.7, 82.5]	72.6 [71.6, 73.6]	83.4 [82.9, 84.0]	89.3 [87.8, 90.7]	87.8 [86.8, 88.9]	87.6 [86.3, 88.9]
Indigenous	67.0 [65.1, 68.9]	57.2 [53.1, 61.3]	69.2 [66.6, 71.7]	78.3 [72.4, 84.2]	70.6 [65.4, 75.8]	65.7 [60.1, 71.2]
(+) Frequent						
Non-Indigenous	79.8 [79.4, 80.2]	71.3 [70.2, 72.3]	81.1 [80.5, 81.7]	86.6 [85.0, 88.2]	84.8 [83.6, 85.9]	84.6 [83.1, 86.0]
Indigenous	63.6 [61.6, 65.6]	55.7 [51.6, 59.8]	65.6 [62.9, 68.3]	74.3 [68.0, 80.6]	64.1 [58.8, 69.4]	63.1 [57.7, 68.5]
(+) Appropriate						
Non-Indigenous women	71.1 [70.7, 71.6]	62.4 [61.4, 63.5]	72.6 [72.0, 73.3]	78.1 [76.2, 80.0]	75.1 [73.7, 76.5]	76.6 [74.9, 78.3]
Indigenous women	54.7 [52.6, 56.9]	46.2 [42.0, 50.3]	57.1 [54.0, 60.1]	58.6 [51.4, 65.7]	55.1 [49.8, 60.4]	58.2 [52.5, 63.9]
(+) Skilled delivery						
Non-Indigenous	70.5 [70.0, 71.0]	61.6 [60.6, 62.7]	71.9 [71.3, 72.6]	77.5 [75.6, 79.4]	74.6 [73.2, 75.9]	75.9 [74.2, 77.6]
Indigenous	49.7 [47.4, 52.1]	41.6 [37.3, 46.0]	51.6 [48.4, 54.9]	53.2 [45.9, 60.6]	51.5 [46.0, 57.0]	52.8 [46.5, 59.1]
(+) Timely postpartum care						
Non-Indigenous	47.4 [46.9, 48.0]	42.7 [41.6, 43.8]	50.1 [49.3, 50.8]	47.4 [45.3, 49.6]	44.2 [42.6, 45.8]	48.8 [46.8, 50.7]
Indigenous	32.5 [30.5, 34.5]	26.9 [23.5, 30.3]	35.5 [32.5, 38.5]	32.0 [25.2, 38.9]	31.9 [27.3, 36.5]	29.9 [24.8, 35.0]
(+) Complication-free postpartum (Effective coverage)						
Non-Indigenous	33.9 [33.3, 34.4]	31.4 [30.4, 32.5]	35.5 [34.8, 36.2]	33.9 [31.9, 35.9]	31.6 [30.2, 33.1]	33.4 [31.6, 35.3]
Indigenous	24.3 [22.5, 26.2]	21.0 [17.9, 24.0]	26.0 [23.1, 28.8]	23.9 [17.9, 29.8]	24.0 [19.8, 28.2]	24.1 [19.3, 28.9]

[a]Pre-Covid-19 period: Jan 2019 to Mar 2020; [b]Covid-19 period: Apr 2020 to Mar 2022; [c]post-Covid-19 period: Apr 2022 to Oct 2023

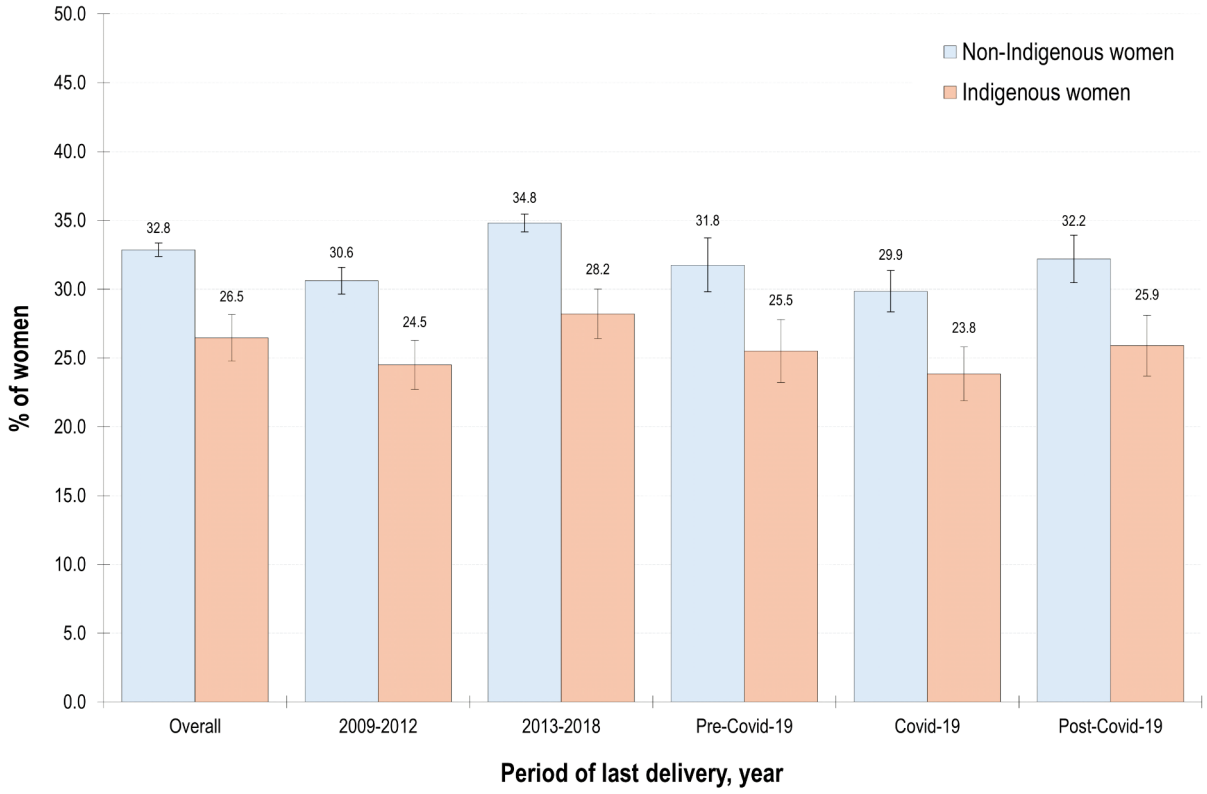

Fig. 1 Pre-post-Covid-19 adjusted effective coverage of maternal health care by Indigenous status. [a]Pre-Covid-19 period: Jan 2019 to Mar 2020; [b]Covid-19 period: Apr 2020 to Mar 2022; [c]post-Covid-19 period: Apr 2022 to Oct 2023

Table 3 Pre-post-Covid-19 decomposition of ethnic gaps in effective coverage of maternal health care

Period of last delivery, year	Raw	Attributable to endowment	Attributable to discrimination	Attributable to interaction between endowment and discrimination
Overall	-0.095	-0.029 (30.82%)	-0.049 (51.66%)	-0.017 (17.52%)
2009–2012	-0.105	-0.044 (42.21%)	-0.042 (40.37%)	-0.018 (17.42%)
2013–2018	-0.095	-0.036 (37.68%)	-0.053 (56.12%)	-0.006 (6.20%)
Pre-Covid-19[a]	-0.100	-0.0002 (0.16%)	-0.075 (75.27%)	-0.024 (24.58%)
Covid-19[b]	-0.077	0.009 (-11.69%)	0.018 (-22.80%)	-0.103 (134.48%)
Post-Covid-19[c]	-0.094	-0.006 (6.83%)	-0.074 (78.72%)	-0.014 (14.45%)

[a]Pre-Covid-19 period: Jan 2019 to Mar 2020; [b]Covid-19 period: Apr 2020 to Mar 2022; [c]post-Covid-19 period: Apr 2022 to Oct 2023

the remaining 17.5% to the interaction between both components. In the first period of analysis (2009–2012), 42.2% of the gap was due to observable differences, 40.4% to ethnic-racial discrimination, and 17.4% to the interaction between these factors. For the 2013–2018 period, these percentages were 37.7%, 56.1%, and 6.2%, respectively. In the pre-Covid-19 stage, the contribution of observable characteristics to the gap was less than 1%, while 75.3% was attributed to discrimination and 24.6% to the interaction of both components. During the pandemic, a slight reduction in the Indigenous-non-Indigenous gap was observed, with the fractions attributable to observable differences and discrimination changing signs (-11.7% and −22.8%, respectively), while the interaction component exceeded 100% (134.5%). Finally, in the post-Covid-19 stage, the percentage of the gap attributable to discrimination returned to levels similar to pre-pandemic levels (78.7%), with 14.5% of the gap explained by the interaction between individual characteristics and discrimination.

Discussion

This population-based study shows the persistence of ethnic and racial inequities in the provision and outcomes of maternal care in Mexico between 2009 and 2023. Ethnic and racial discrimination, exacerbated by

the pandemic and the elimination of social programs and health insurance for the poorest populations, including Indigenous peoples, highlights the urgent need for comprehensive policies with targeted anti-racist interventions with a strong gender component.

The ECMH indicator we assessed considers the gains in maternal health that result from the health system's performance [55–57]. As the duration of pregnancy is less than one year and the demand for maternal health services is constant, the ECMH is sensitive to measurable changes annually. The low levels of ECMH throughout the study period are a strong indicator of poor health system performance [56] and outdated structures. However, the steady trend of improvement between 2009 and 2018 shows the effectiveness of several measures implemented during this period, which did not achieve optimal results but strengthened the health system's response to maternal needs. These include POP and SP. In addition to placing women in charge of cash transfers, POP prioritized women's health and, in particular, maternal health interventions [24]. Furthermore, it generated additional demand for services because pregnant women affiliated with the program were co-responsible for using them [58]. This program led to a sustained increase in antenatal care, delivery care, and postnatal follow-up services among women affiliated women to POP from 1997 to 2018 [34]. On the other hand, SP expanded the availability and coverage of health services, improving their accessibility [34], although it has also been particularly associated with greater use of antenatal care services [59]. Thus, POP and SP instituted a synergy that strengthened the demand, on the one hand, and the supply of maternal health services, on the other [34]. Additionally, the program Fair Start in Life (*Arranque Parejo en la Vida* in Spanish), which was created in 2001 and was active for three administrations, had a strong maternal health component and included initiatives in maternal care aimed at achieving the objectives in this field of the Millenium Development Goals [35, 60]. This program was discontinued in 2019 as part of the restructuring of social programs in Mexico. Finally, in 2016, the official Mexican standard for the care of women during pregnancy, childbirth, puerperium, and newborns was renewed [39], which contributed to improving the technical content of maternal health actions and strengthening their regulation.

The rates of ECMH dropped in the pre-Covid-19 period, from December 1, 2018, to March 30, 2020. This decrease is explained by political factors endogenous to the health system, particularly the decision to disappearance of POP and SP Programs [20]. These measures had two effects: on the one hand, the dramatic increase in the number of persons without access to health services (15.6 million) between 2018 and 2020 [61] and, on the other, the decrease in the use of public services for antenatal care, skilled birth attendance, and postnatal follow-up [62]. The disappearance of POP also dismantled an extensive network of community health assistants and promoters built up over more than two decades, mainly in Indigenous, rural, and highly marginalized regions, who devoted their work to the health of women and children [63]. This social infrastructure dedicated to the promotion of the use of health and educational services was replaced by another program—the so-called *Siervos de la Nación* (Servants of the Nation)—whose essential function is political clientelism [64].[1]

The additional fall in ECMH coverage during the pandemic resulted from the health contingency itself (e.g., hospital reconversion, stay-at-home orders, or commuting restrictions). These rates recovered modestly for non-Indigenous women in the post-pandemic period but remained practically unchanged for Indigenous women.

By linking the need for healthcare with the ability to access the services that satisfy it, the ECMH indicator is also sensitive to structural inequalities [65], as the exercise of rights is conditioned by the type of social organization. Throughout the study period, we identified systematic gaps in the ECMH to the detriment of Indigenous women compared to non-Indigenous women. This is a consequence of structural discrimination against Indigenous people, which is reflected in the performance of the health system. While the gap itself can be seen as a consequence of discrimination, it is partly due to the covariates included in the statistical model shown in Table 1, so the remaining part can be attributed to the exclusive effect of discrimination. The beauty of this methodology is that it attempts to measure precisely a phenomenon of extraordinary complexity, at once pervasive and elusive.

Over the study period, 51.6% of the gap in the ECMH can be attributed to ethnic-racial discrimination, a figure that increased from 40.3% in 2009–2012 to 75.3% in the pre-Covid period and to 78.7% during the post-Covid period. This means that ethnoracial discrimination related to ECMH almost doubled in the analysis period. Endogenous political factors, such as the decision to abolish POP and SP, may have been responsible for the increase in the proportion of inequity attributable to discrimination in the ECMH. Although these programs did not include anti-racist measures, they explicitly prioritized the coverage of Indigenous and populations living

[1] The *Siervos de la Nación*, affiliated with the Secretaría del Bienestar, were initially tasked with promoting the Morena party during its electoral campaigns, which led to its presidential victories in 2018 and 2024. Under Morena's administration, the *Siervos de la Nación* became responsible for conducting the census of beneficiaries for federal social programs and monitoring their implementation. However, they do not perform technical roles in the delivery of education or health services. [64].

in poverty, and adopted intercultural approaches [66]. The cancellation of these programs led to a decrease in maternal health coverage and an increase in maternal deaths and health discrimination against Indigenous populations. The pandemic seems to have exacerbated inequities as a result of structural discrimination.

Other indicators confirm the effects of structural discrimination: Indigenous women systematically have lower levels of education, lower paid labor force participation, lower socio-economic position, higher parity, and are more likely to live in rural and impoverished areas. These women suffer three types of discrimination: for being women, Indigenous, and poor [3]. This limits their access to health services and determines various forms of mistreatment, such as contempt, neglect, abuse, and blame for the deterioration of their health [2, 8, 67]. These conditions create a hostile environment in health services, reinforcing stereotypes that discourage their use, creating a slippery slope that increases inequities generally and in maternal health specifically.

The decomposition analysis results for the pandemic period require further interpretation. During the pandemic, structural inequalities and discriminatory effects showed a temporary reduction in the gap, probably due to the redistribution of resources, emerging universal access policies, and the lowering of traditional barriers. However, the interaction between endowments and discrimination intensified, reflecting the structural vulnerability of Indigenous communities, which exposed them more to the adverse effects of the crisis, which ended up widening the gap as observed in the post-Covid-19 period. This suggests that the pandemic exacerbated health inequalities and modified the interaction between these factors, making this interaction the primary driver of inequity. First, the restructuring of the health system and the redistribution of resources during the pandemic reduced some infrastructure and access gaps. However, this impact was uneven, and Indigenous communities affected by the disruption of non-emergency services faced greater barriers to care other than Covid-19. This is consistent with the evidence of higher mortality risk among the Indigenous population during the pandemic [18, 68, 69]. Second, although temporary measures alleviated specific barriers, the structural vulnerability of Indigenous communities remained. Factors such as geographic distance and technological limitations worsened health outcomes, showing that the crisis aggravated pre-existing inequalities. Third, the interaction between endowments and discrimination added to and amplified each other. The lack of basic resources in Indigenous communities exacerbated the effects of discrimination in health care, as these already disadvantaged populations suffered more severely from the overburdening of the health system. Thus, although emerging policies attempted to reduce inequalities, structural vulnerabilities, such as poverty, geographic isolation, and limited access to health infrastructure remained a significant obstacle. This scenario deepened the effects of discrimination, making it even more difficult for Indigenous women to access emergency obstetric services. The combination of poor infrastructure and persistent discrimination intensified the adverse effects on this group.

Our study should be interpreted with some limitations in mind. First, although the ENADID is a robust and high-quality population-based survey, this observational analysis is subject to possible omitted variable biases, which limit the strength of the causal inferences we can make. Second, while we assessed a significant event, such as the birth of a child and that the reference period spanned the five years before the survey, which helps mitigate recall bias, self-reported variables, such as the timing of the first prenatal visit, may be subject to this type of bias. Third, the temporalities of events and covariates were recorded at the time of the survey rather than at the time of delivery. Fourth, data on postnatal care are limited: women may confuse their postpartum visits with visits for their newborns, and the survey does not capture details about the content of those visits. Fifth, although we analyzed a single survey, the different waves did not prioritize the same ANC processes. Based on previous studies, we defined the appropriate ANC [10, 34] assuming 75% coverage for the procedures considered. This could have led to an overestimation of coverage in the early years and an underestimation of the increase over time. Sixth, identifying the Indigenous population was based solely on language, which probably underestimates its size. Other criteria, such as living in an Indigenous household or self-identification, might have shown a different proportion of the Indigenous population. We were also unable to analyze the various ethnic groups within the Indigenous population, although we recognize their heterogeneity, with some groups probably facing lower levels of effective health coverage. Seventh, it is important to recognize that the BO decomposition could be sensitive to model specification [53] because BO assumes a model of mediation where the inclusion of post-birth variables lie on the causal pathway between ethnicity and health outcomes. Even if the exercise is purely descriptive, the outcome-mediator confounding problem can impose a bias on regression coefficients [70], effectively distorting the magnitude of the explained components of inequities. To partially address these issues, we conducted several sensitivity analyses, incorporating interaction terms between the Indigenous condition and multiple key variables to identify possible effect modifiers; by estimating additive models, we confirmed the robustness of the results. Finally, while this method helps explore the causes of the ECMH gap, it has limitations in

identifying the leading cause of the unexplained portion. Although it is possible to propose several reasons behind this gap, the decomposition does not provide sufficient information to determine which is most likely to cause the gap [71]. Additionally, other confounding factors—whether observed or unobserved—could also influence these uncontrolled differences. Nevertheless, we have used a broad set of variables that allow us to obtain an overview of the magnitude of the gap likely related to structural racial-ethnic discrimination.

Despite its limitations, our study has several notable strengths. It leverages a robust, decade-long population-based dataset to comprehensively analyze ethnic and racial inequities in maternal healthcare in Mexico. By applying the ECMH indicator, the study provides a nuanced understanding of health system performance and its response to structural inequalities. Decomposition analysis quantifies the contribution of ethnic and racial discrimination to these inequities with methodological rigor. Additionally, the study contextualizes its findings within major policy changes and the Covid-19 pandemic, illustrating how systemic changes, exacerbated by the pandemic, have disproportionately impacted Indigenous women. The originality of this paper lies in its exploration of how these inequities have evolved and deepened during the global health crisis, offering new insights into the intersections of race, gender, and health policy in the post-pandemic era.

The variety of ways in which racist and discriminatory practices manifest themselves and their consequences in terms of mistreatment, personal suffering, barriers to access to services, lower quality of these services, dissatisfaction of users, and poor health outcomes make them difficult to quantify. For this reason, multifaceted approaches are needed to question and attempt to discern the role of cultural differences, social stratification, and the discriminatory ideologies that sustain them. This is the main contribution of the metric used in this analysis.

To improve Indigenous women's ECMH and move towards UHC, the health system must, firstly, prioritize this agenda and, secondly, incorporate anti-discriminatory and anti-racist measures in all its areas —clinical and administrative spaces, rules and regulations, and monitoring and evaluation systems— to ensure dignified, patient-centered treatment at all times within a human rights framework. At the same time, specific strategies should be designed and implemented to counteract the negative stereotypes that characterize sexual and reproductive health services and discourage their use, especially among Indigenous populations.

If efforts to achieve UHC do not specifically address inequality-generating structures based on discriminatory ideologies, they risk regressing, benefiting mainly the most advantaged sectors and postponing attention to those with greater vulnerabilities. These efforts must be accompanied by enforcement mechanisms that guarantee the exercise of rights, cultural adaptation, and respectful treatment of the most vulnerable individuals and groups. In addition, the criterion for access to health care must recognize cultural diversity and equality.

To improve the health system's performance in addressing the needs of Indigenous populations and achieve UHC, it is not enough to propose cultural (or intercultural) adaptations [72, 73]. It is imperative to recognize and monitor the toll of discrimination in health system performance indicators that separate Indigenous and non-Indigenous populations and to implement anti-racist and anti-discrimination policies to ensure the dignified treatment of all people, especially members of social groups that have been historically discriminated against [72, 74]. Only by implementing health policies that effectively address the structures of inequality will it be possible to move towards an equitable and universal health system in Mexico. Tackling structures of inequality based on racist ideologies requires not only explanatory frameworks that help us to understand how stratified social organization impacts the performance of the health system but also concrete organizational proposals that allow us to address them effectively. In this sense, the participation of affected communities can enhance our understanding of the problem and help formulate comprehensive solutions.

Abbreviations

UHC	Universal Health Coverage
ECMH	Effective coverage of maternal health interventions
ENADID	Encuesta Nacional de la Dinámica Demográfica
LAC	Latin America and the Caribbean
POP	Progresa-Oportunidades-Prospera Program
SP	Seguro Popular
IMSS	Instituto Mexicano de Seguridad Social
SDGs	Sustainable Development Goals
ANC	Antenatal care
INSABI	Instituto de Salud para el Bienestar
BO	Blinder-Oaxaca decomposition

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Author contributions

ESM conceived the idea for this study. ESM designed the study. ESM and SMN wrote the first draft of the manuscript, with RGD, DCG, DCL, OGD and AC providing critical input on multiple drafts. All authors were involved in the review of the paper and approved the final version. ESM is the guarantor of the work; as such, he had full access to all the data in the study and accepts responsibility for the integrity of the data and the accuracy of the data analysis.

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Data availability
The final database underlying this study has been uploaded to Figshare and is freely accessible using the following link: https://doi.org/10.6084/m9.figshare.27245664.v1.

Declarations

Ethics approval and consent to participate
Not applicable. This study involved no human participants.

Memorial dedication
We dedicate this manuscript to our colleague and friend Sandra Sosa-Rubí, Ph.D., who inspired us to analyse equity during her fruitful lifetime and passed away in March 2021.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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