Journal of Migration and Health 10 (2024) 100273

Contents lists available at ScienceDirect

Journal of Migration and Health

journal homepage: www.elsevier.com/locate/jmh

Factors associated with attendance to and completion of prenatal care visits in Colombia among urban-residing Venezuelan refugee and migrant women

Justin Unternaher [a,b], José Rafael Guillén [c], Jennifer Ortíz [c], Megan Stevenson [d], Miguel Ángel Barriga Talero [c], Kathleen R. Page [a,d,e], Jhon Jairo López [c], Jhon Fredy Ramírez Correa [c], Ricardo Luque Núñez [f], Julián A. Fernandez-Niño [g], Paul B. Spiegel [a], Elana Liebow-Feeser [e], Andrea L. Wirtz [a,d,*]

[a] Department of International Health, Center for Humanitarian Health, Johns Hopkins School of Public Health, Baltimore, USA
[b] Department of Infectious Diseases, Children's National Hospital, Washington, DC, USA
[c] Red Somos, Bogotá, Colombia
[d] Department of Epidemiology, Center for Public Health and Human Rights, Johns Hopkins University Bloomberg School of Public Health, Baltimore, USA
[e] Johns Hopkins School of Medicine, Baltimore, USA
[f] Ministry of Health and Social Protection, Bogotá, Colombia
[g] Department of International Health, Johns Hopkins University Bloomberg School of Public Health, Baltimore, USA

ARTICLE INFO

Keywords:
Colombia
Venezuela
Migrant
Refugee
Displacement
Prenatal care
Maternal health
Humanitarian health
Healthcare acces

ABSTRACT

Between 2015 and 2023, 7.3 million Venezuelans have been displaced globally. We aimed to assess uptake of and factors associated with prenatal care among Venezuelan refugees and migrants in Colombia. We analyzed data from a cross-sectional survey of 6,221 urban-residing adult Venezuelans who were displaced to Colombia between 2015 and 2022. Analyses were restricted to 917 women aged 18–49 years who reported at least one pregnancy and delivered in Colombia; of these, 564 (61.5%) women completed ≥4 prenatal care visits in their most recent pregnancy. We used general linear models with negative binomial regression to identify associations and estimate the adjusted prevalence ratios (aPrR) of variables associated with completing ≥4 prenatal care visits during last complete pregnancy (WHO's pre-2016 recommendations). Having an irregular migration status was independently associated with a 12% lower likelihood (aPrR:0.88, 95%CI:0.78–0.99; $p = 0.028$) of completing ≥4 prenatal care visits compared to women with a regular status. Participants who reported an experience of denial of prenatal care at some point while Colombia ($n = 135$; 15.2%) were 42.8% less likely (aPrR:0.57, 95% CI:0.45–0.73; $p < 0.001$) to complete ≥4 prenatal care visits than those with no reported denial of care. Urban area of residence was also independently associated with prenatal care, while there was no evidence of association with educational attainment, literacy levels, or year of migration. Prenatal care attendance is suboptimal among Venezuelan refugees and migrants, particularly those with an irregular migration status, despite that prenatal care became officially available in 2018 to all Venezuelans in Colombia regardless of migration status. Reducing barriers to prenatal care by ensuring Venezuelan refugees and migrants are aware of available care, are supported in navigating the health system, and by preventing discrimination and stigma in the health facility are critical to ensuring the health and wellbeing of displaced people, their children, and the surrounding community.

Introduction

The economic crisis and political instability in the Bolivarian Republic of Venezuela have contributed to the deterioration of the country's healthcare infrastructure (Page et al., 2019). As a result of this crisis, extant literature has shown that Venezuelans are experiencing poor health outcomes due to increasing violence and crime, and shortages of food, medicine, vaccines, and basic services in their country (Page et al., 2019). In particular, infant and maternal morbidity and mortality rates in Venezuela have increased during this crisis (UNICEF. Venezuela, 2020). In 2015, infant mortality was estimated at 16.5 deaths per 1000 live births; however, in 2016, the rate increased and has

* Corresponding author.
E-mail address: awirtz1@jhu.edu (A.L. Wirtz).

https://doi.org/10.1016/j.jmh.2024.100273
Received 5 March 2024; Received in revised form 3 October 2024; Accepted 4 October 2024
Available online 11 October 2024

remained constant at 21.1 deaths per 1000 live births (UNICEF. Venezuela, 2019). While most countries have had reductions in maternal deaths over the last two decades, a UN analysis of trends in maternal mortality rates (MMR) has shown that the MMR in Venezuela increased by 182% from 2000 to 2020 – the highest percent increase globally (World Health Organization, 2023). In 2020, the MMR for Venezuela was estimated at 259 maternal deaths per 100,000 live births, compared to 75 and 88 estimated for neighboring Colombia and the wider Latin America and Caribbean region, respectively, though progress on maternal and infant mortality have been stalled in most countries during and following the onset of the COVID-19 pandemic (Page et al., 2019; World Health Organization, 2023). As a result of these conditions, 7.3 million Venezuelan refugees and migrants have been displaced globally between 2015 and 2023, with almost 50% being women of reproductive age in 2019 (Inter-Agency Coordination Platform for Refugees and Migrants from Venezuela, 2023; Giraldo et al., 2021). Colombia has been the leading country hosting Venezuelans and, as of 5 September 2023, it was estimated that almost 2.9 million Venezuelan refugees and migrants were residing in Colombia (Inter-Agency Coordination Platform for Refugees and Migrants from Venezuela, 2023).

In Colombia, Venezuelans who have a regular migration status (i.e., authorized to remain in Colombian territory legally as a result of regularization programs) are able to access formal employment and health insurance as Colombian citizens; however, people with an irregular migration status (i.e., not legally authorized to remain in Colombia) do not have this same access (Bitar, 2022). Given the large number of Venezuelan women of reproductive age residing in Colombia, the Ministry of Health and Social Protection granted the right for people with irregular migration status to receive free prenatal check-ups, childbirth and postnatal care beginning in 2018 (Giraldo et al., 2021; Angeleri, 2022). This policy change was intended to enable displaced women to access prenatal care visits regardless of their migration status in alignment with WHO recommendations and in recognition of the evidence that prenatal care contacts can prevent future complications during pregnancy and delivery, identify and manage maternal health conditions, encourage positive health behaviors, and develop a patient-provider relationship (World Health Organization, 2016).

During this time period, the World Health Organization (WHO) revised their guidelines and increased the minimum number of recommended prenatal care visits per pregnancy from 4 to 8 in 2016 (World Health Organization, 2016). Prior to 2018, Colombia's *Departamento Administrativo Nacional de Estadistica* (DANE) reported that 24.7% of Venezuelan mothers that gave birth had received ≥6 prenatal care visits; by comparison, 67.0% of Colombian mothers received ≥6 visits in 2017 (Garnica-Rosas et al., 2021). Corresponding to lower number of prenatal care visits, birth outcomes for Venezuelans in Colombia have included lower birth weight, more preterm births, and Apgar scores <7, when compared to births among Colombia women between 2016 and 2018 (Garnica-Rosas et al., 2021; Guarnizo-Herreño and Wehby, 2021). Likewise, differences in mortality rates between Venezuelan and Colombian women living in Colombia have been reported and, while the gap has narrowed, it has persisted over time (Bonilla-Tinoco et al., 2020).

Little population-based reproductive health data for displaced Venezuelans exist outside of clinical settings and, to our knowledge, no study has investigated factors associated with prenatal care among the Venezuelan population. Thus, we aimed to assess prenatal care attendance and factors associated with completion of an optimal number of prenatal care contacts during pregnancy among Venezuelan refugees and migrants in Colombia.

Methods

We analyzed data collected from BIENVENIR Project (*Bienestar de Venezolanos que son Inmigrantes y Refugiados)*, a cross-sectional study that surveyed adult Venezuelans who were displaced to Colombia in 2015 or later. The study was designed through collaborative efforts between a community-based organization, *Red Somos*, the Colombian Ministry of Health and Social Protection, and a research institution, Johns Hopkins University. We used formative, qualitative research to inform subsequent research methods, survey measures, and messaging for the biobehavioral survey (Stevenson et al., 2023). Data collection was conducted by *Red Somos* between July 30, 2021, and February 5, 2022. Participants were recruited through respondent-driven sampling (RDS), a chain referral method used to reach populations for whom no sampling frame exists (Heckathorn, 2014). Participants completed study activities in private office space owned by *Red Somos*. The methods for the initial study have been previously reported (Wirtz et al., 2022, 2023).

Ethics statement

All study activities were reviewed and approved by the Ethical Review Committee at the Universidad El Bosque in Bogotá, Colombia (Acta No. 022-2020), and the Institutional Review Board at Johns Hopkins University School of Public Health (IRB No. 11598). In addition, the protocol was reviewed in accordance with CDC human research protection procedures. All participants completed written informed consent to participate in the study. Participants were provided referrals for health and humanitarian services when need was identified.

Study design

The locations of the cross-sectional survey included two sites that encompassed neighboring cities: (i) Bogotá and Soacha; and (ii) Barranquilla and Soledad. These neighboring cities were chosen due to their proximity and accessibility to humanitarian and health programs, distribution of Venezuelan refugees and migrants, and lower presence of pendular refugees and migrants or transiting through Colombia to reach a different country (Wirtz et al., 2022).

Eligibility criteria for the parent study included: self-reported Venezuelan nationality; self-reported birth in Venezuela; migration to Colombia in 2015 or later; current residence in one of the above study cities; being aged ≥18 years; no intention to migrate outside of Colombia; no prior participation by an immediate family member; and possession of valid study RDS coupon, which was needed for the recruitment process (Wirtz et al., 2022, 2023). A total of 6,221 people met eligibility criteria and were enrolled into the study; of these, we restricted the analytic sample to 917 cisgender women between 18 and 49 years of age who reported at least one delivery in Colombia. Prenatal care measures referred to the current or last pregnancy; thus, women that were pregnant at the time of survey completion were not included this analysis to ensure that the number of visits reported covered the full gestational period.

Data collection

The survey measures covered broad domains of demographics; displacement and migration status; familial and social relations; health history; food security; experiences with prenatal care; and utilizing humanitarian services. Where applicable, the survey utilized existing and validated measures that have been implemented in Colombia, Venezuela, or the wider region to ensure relevancy to target population. Basic demographic information (employment, housing, income, education and relationship status) were adapted from the Colombian Demographic Health Survey (The Demographic and Health Surveys Program, 2015). Migration and displacement measures included current migration status, year of migration to Colombia, motivation for migration, and access to humanitarian services. We measured participant social network size, defined as the number of adult Venezuelans the participants knows and had seen in the city of residence in that past two weeks. Food security was measured using a 4-item scale developed by the USDA (USDA et al., 2021). Violence victimization was assessed using the Assessment Screen to Identify Survivors Toolkit for Gender-Based Violence screen for displaced populations, which had been developed

among internally displaced Colombians (Vu et al., 2016; Wirtz et al., 2016). Individuals screened positive for violence if they reported at least one form of physical, psychological, and/or sexual violence while in Colombia (Vu et al., 2016; Wirtz et al., 2016). General health measures included access to general health services, diagnosed chronic health condition, access to care for chronic health conditions. Prenatal care experiences included number of births while residing in Colombia, number of prenatal care visits attended during last pregnancy. We developed additional measures to collect information on experienced denial of or disrespect during their prenatal care visit because of their Venezuelan origin and/or whether participants had witnessed similar acts. Women were also asked if they were treated with empathy during their visits.

To minimize COVID-19 transmission risk and respect the literacy and preferences of participants, the survey was completed via an electronic, self-administered questionnaire accompanied with staff support. Staff administered the questionnaire to participants with low literacy (defined as a score >6 using the Spanish language version of the Rapid Estimate of Adult Literacy in Medicine–Short Form) or limited technology literacy (Arozullah et al., 2007). As the pandemic progressed, local COVID-19 policies were adhered to.

Data analysis

The dependent variable of interest was whether the participant had attended the recommended number of prenatal care visits during their last complete pregnancy in Colombia. Number of prenatal care visits at last pregnancy in Colombia was measured categorically in the survey questionnaire as 0, 1, 2, 3, or 4 or more. To evaluate the uptake and completion of the recommended minimum number of prenatal care visits, we reclassified the number of prenatal visits a participant reported receiving to <4 or ≥4 prenatal care visits following pre-2016 WHO standards (World Health Organization, 2002). We used the pre-2016 guidelines given that some women may have migrated and been pregnant prior to the change in guidance.

Independent variables of interest considered included: age, the city of residence, social network size, employment status, housing status, income, migration status, migration year, education and literacy level, relationship status, reported chronic health conditions, food security, experiences receiving or witnessing prenatal care, the number of births in Colombia, violence victimization, and whether the participant utilized humanitarian resources in Colombia. These variables were selected based on conceptual association and/or prior reports demonstrating association with attendance to and completion of prenatal care (Giraldo et al., 2021; Alibhai et al., 2022; Cubides et al., 2022). To measure change after policy change (migration year) and to avoid sparse data bias in categorical variables (employment status, social network size, residence, income, education obtainment, relationship status, food security) variables were further collapsed for regression analysis (Greenland et al., 2016).

We began with descriptive statistics to describe the sample and identify differences in responses between women with <4 prenatal care visits and those that had ≥4 visits using Pearson's Chi-square test to compare categorical variables and Wilcoxon rank-sum for continuous variables. We also calculated population estimates for this group using the Volz Heckathorn estimator for RDS (Supplemental appendix) (Volz and Heckathorn, 2008).

Given the distribution of prenatal care (62% had completed ≥4 visits), we calculated prevalence ratios (PrR) of variables associated with prenatal care, instead of odds ratios, as these are more appropriate measure of association for common outcomes (Greenland, 1987). General linear models with Poisson regression were first used, but poor goodness-of-fit was determined with $p = 1.00$. Negative binomial models were then used to calculate prevalence ratios due to overdispersion. To further control for overdispersion of standard error, we used a robust variance estimator. Model building began with unadjusted negative binomial regression models to identify variables associated with completing ≥4 prenatal care visits. This was followed by the construction of a final negative binomial model that included variables that were significant at $p < 0.05$ in the unadjusted model and were conceptually associated with prenatal care. Variables were retained in the final model if they remained statistically significant at $p < 0.05$; variables that were no longer associated with the outcomes in the multivariable model (e.g., education, relationship status, and self-reported health) were dropped for model parsimony. We used Akaike information criteria (AIC) to identify the most appropriate model amongst alternatives. Year of migration, literacy, use of humanitarian services, and food security were retained regardless of association in the final model, given potential associations with prenatal care attendance due to temporal changes in policy (migration year), access to information (literacy and humanitarian services) and potential prioritization of basic needs (food security) over healthcare.

We evaluated collinearity in the final models using variance inflation factor (VIF) tests. VIF scores for all variables included in the final model were ≤1.19. Witnessing denial of prenatal care and being disrespected during a prenatal care visit were significant at the bivariate level but were omitted from the final model due to high VIF scores that suggested collinearity with denial of care. Item missingness was <10% across all included variables; thus, additional imputation was not performed. Analyses were not weighted for sampling since RDS weighting is not recommended for regression modeling (Avery et al., 2019). Data management and statistical analyses were performed using Stata (StataCorp, version 17).

Results

Table 1 displays the characteristics of the 917 women who comprised the analytic sample, stratified by number of prenatal care visits (Appendix A.1 displays the population estimates). Over 80% had completed secondary education or higher and had correspondingly high literacy. More than half of participants were unemployed ($n = 520$; 56.7%), 34% ($n = 320$) had informal employment, and 80% had incomes below minimum wage. The majority of women ($n = 666$; 72.6%) reported having irregular status and migrated between 2017 and 2019 ($n = 747$; 81.5%).

Of the 917 women, 61.5% ($n = 564$) completed ≥4 prenatal care visits during their last pregnancy. This produced a population estimate of 58.6% (95%CI: 52.6–64.4) prevalence of recommended prenatal care visits. Participants who had completed <4 prenatal care visits were more likely to have an irregular status and had migrated slightly later than those who completed the optimal number of visits. Among participants with an irregular status, 59.0% (393/666) had completed the recommended number of prenatal care visits, compared to 68.1% (171/251) among those with a regular status. Women who had received <4 prenatal care visits were more likely to report fair or poor health compared to those that received ≥4 (27.2% vs 18.7%). Women who reported ≥4 prenatal care visits reported slightly higher numbers of prior pregnancies in Colombia than those with fewer visits. There was no difference in education, literacy, employment, income, or chronic condition between those that completed <4 visits compared to those that completed ≥4.

Over 20% of total participants reported being treated with empathy in prenatal care because of Venezuelan origin; however, this was reported by more participants who had completed <4 prenatal care visits than those who completed more (24.7% vs. 19.0%). 12% to 15% of participants reported experiences of or witnessing stigma and discrimination in prenatal care due to their origin across the four measures. These were different across participants by number of prenatal care visits, as women who had received <4 visits were more likely to report past experiences of or witness of denied prenatal care or disrespectful treatment during prenatal care, compared to women who had received ≥4 visits.

Table 2 displays the results of unadjusted and adjusted prevalence

Table 1
Participant characteristics and differences by prenatal care attendance among urban-residing Venezuelan migrants and refugee women in Colombia.

		Prenatal care attendance at last complete pregnancy		
	Total *N* = 917	Below pre-2016 WHO Recommendations (<4 Visits) *N* = 353	At or above pre-2016 WHO recommendations (≥ 4 Visits) *N* = 564	p-value
	n (%)	n (Column %)	n (Column %)	
Age, y, median (IQR)	27 (23–31)	26 (23–30)	27 (23.5–31)	<0.001
Site city, n (%)				<0.001
Bogotá	212 (23.1%)	105 (29.7%)	107 (19.0%)	
Soacha	166 (18.1%)	78 (22.1%)	88 (15.6%)	
Barranquilla	314 (34.2%)	107 (30.3%)	207 (36.7%)	
Soledad	225 (24.5%)	63 (17.8%)	162 (28.7%)	
Social network size (# of Venezuelan adults known and seen in past two weeks), median (IQR)	10 (5–20)	10 (5–20)	10 (5–20)	0.13
Employment status, n (%)				0.092
Formal full-time	32 (3.5%)	14 (4.0%)	18 (3.2%)	
Formal part-time	29 (3.2%)	14 (4.0%)	15 (2.7%)	
Informal/ under the table	320 (34.9%)	111 (31.4%)	209 (37.1%)	
Full-time student	2 (0.2%)	2 (0.6%)	0 (0.0%)	
Retired	2 (0.2%)	1 (0.3%)	1 (0.2%)	
Unemployed	520 (56.7%)	203 (57.5%)	317 (56.2%)	
Other	12 (1.3%)	8 (2.3%)	4 (0.7%)	
Current residence, n (%)				0.44
ome/ apartment/ room I rent	820 (89.4%)	311 (88.1%)	509 (90.2%)	
Home/ apartment that I own	17 (1.9%)	7 (2.0%)	10 (1.8%)	
Staying at someone else's place	54 (5.9%)	24 (6.8%)	30 (5.3%)	
Shelter/ halfway house	3 (0.3%)	3 (0.8%)	0 (0.0%)	
Camp	8 (0.9%)	3 (0.8%)	5 (0.9%)	
Abandoned building	1 (0.1%)	0 (0.0%)	1 (0.2%)	
No current residence/ shelter	4 (0.4%)	2 (0.6%)	2 (0.4%)	
Other	10 (1.1%)	3 (0.8%)	7 (1.2%)	
Income, n (%)				0.87
Less than minimum wage	735 (80.2%)	284 (80.5%)	451 (80.0%)	
Minimum wage	127 (13.8%)	46 (13.0%)	81 (14.4%)	
Greater than minimum wage	49 (5.3%)	20 (5.7%)	29 (5.1%)	
More than 1817,052 pesos	6 (0.7%)	3 (0.8%)	3 (0.5%)	
Migration status, n (%)				0.011
Regular	251 (27.4%)	80 (22.7%)	171 (30.3%)	
Irregular	666 (72.6%)	273 (77.3%)	393 (69.7%)	
Migration year, n (%)				0.013
2015	26 (2.8%)	8 (2.3%)	18 (3.2%)	
2016	92 (10.0%)	25 (7.1%)	67 (11.9%)	
2017	195 (21.3%)	67 (19.0%)	128 (22.7%)	
2018	295 (32.2%)	113 (32.0%)	182 (32.3%)	
2019	257 (28.0%)	118 (33.4%)	139 (24.6%)	
2020	37 (4.0%)	13 (3.7%)	24 (4.3%)	
2021	15 (1.6%)	9 (2.5%)	6 (1.1%)	
Education attainment, n (%)				0.16
No formal education	5 (0.5%)	3 (0.8%)	2 (0.4%)	
Primary	138 (15.0%)	61 (17.3%)	77 (13.7%)	
Secondary	569 (62.1%)	223 (63.2%)	346 (61.3%)	
Higher	194 (21.2%)	63 (17.8%)	131 (23.2%)	
Other	11 (1.2%)	3 (0.8%)	8 (1.4%)	
Literacy level, n (%)				0.30
Low Literacy	144 (15.9%)	50 (14.3%)	94 (16.9%)	
High Literacy	763 (84.1%)	300 (85.7%)	463 (83.1%)	
Relationship status, n (%)				0.11
Never married	271 (29.6%)	118 (33.4%)	153 (27.1%)	
Married or cohabitating	565 (61.6%)	200 (56.7%)	365 (64.7%)	
Divorced or separated	76 (8.3%)	33 (9.3%)	43 (7.6%)	
Widowed	5 (0.5%)	2 (0.6%)	3 (0.5%)	
Has chronic condition, n (%)				0.96
No	849 (92.6%)	327 (92.6%)	522 (92.6%)	
Yes	68 (7.4%)	26 (7.4%)	42 (7.4%)	
Food security level, n (%)				0.047
Secure	46 (5.0%)	18 (5.1%)	28 (5.0%)	

(*continued on next page*)

Table 1 (*continued*)

	Total *N* = 917 n (%)	Prenatal care attendance at last complete pregnancy: Below pre-2016 WHO Recommendations (<4 Visits) *N* = 353 n (Column %)	Prenatal care attendance at last complete pregnancy: At or above pre-2016 WHO recommendations (≥ 4 Visits) *N* = 564 n (Column %)	p-value
Low food security	181 (19.7%)	84 (23.8%)	97 (17.2%)	
Very low food security	690 (75.2%)	251 (71.1%)	439 (77.8%)	
Denied prenatal care due to Venezuelan origin, n (%)				<0.001
No	755 (84.8%)	249 (74.3%)	506 (91.2%)	
Yes	135 (15.2%)	86 (25.7%)	49 (8.8%)	
Witnessed denied access to prenatal care due to Venezuelan origin, n (%)				<0.001
No	751 (84.4%)	261 (77.9%)	490 (88.3%)	
Yes	139 (15.6%)	74 (22.1%)	65 (11.7%)	
Disrespected during prenatal care due to Venezuelan origin, n (%)				<0.001
No	788 (87.6%)	282 (82.5%)	506 (90.7%)	
Yes	112 (12.4%)	60 (17.5%)	52 (9.3%)	
Witnessed disrespect during prenatal care due to Venezuelan origin, n (%)				0.062
No	784 (87.8%)	287 (85.2%)	497 (89.4%)	
Yes	109 (12.2%)	50 (14.8%)	59 (10.6%)	
Treated with empathy because of Venezuelan origin, n (%)				0.044
No	698 (78.9%)	250 (75.3%)	448 (81.0%)	
Yes	187 (21.1%)	82 (24.7%)	105 (19.0%)	
Number of births in Colombia, n (%)				0.045
1	798 (87.0%)	309 (87.5%)	489 (86.7%)	
2	88 (9.6%)	26 (7.4%)	62 (11.0%)	
3	21 (2.3%)	12 (3.4%)	9 (1.6%)	
4 or more	10 (1.1%)	6 (1.7%)	4 (0.7%)	
Experienced psychological, physical, or sexual violence victimization while in Colombia, n (%)				0.21
No	873 (95.4%)	331 (94.3%)	542 (96.1%)	
Yes	42 (4.6%)	20 (5.7%)	22 (3.9%)	
Used humanitarian resources in Colombia, n (%)				0.15
No	657 (71.7%)	262 (74.4%)	395 (70.0%)	
Yes	259 (28.3%)	90 (25.6%)	169 (30.0%)	

ratios (aPrR) estimated from negative binomial regression models of factors associated with completing ≥4 prenatal care visits. In the adjusted model, age was positively associated with receiving ≥4 prenatal care visits (aPrR: 1.01, 95%CI: 1.00–1.02; $p = 0.017$). Participants who resided in Barranquilla and Soledad were 1.23 times more likely to have completed ≥4 prenatal care visits (aPrR: 1.23; 95%CI: 1.09–1.39; $p = 0.001$) compared to Bogotá and Soacha. Conversely, participants with an irregular migration status had an adjusted 12% lower likelihood (aPrR: 0.88, 95%CI: 0.78–0.99; $p = 0.028$) of completing ≥4 prenatal care visits compared to those with a regular migration status. Finally, participants who reported denial of care were 43% less likely to complete ≥4 visits compared to those that reported no care denial (aPrR: 0.57; 95%CI: 0.45–0.73; $p < 0.001$). Of note, the year of migration was significantly associated at the bivariate level but was no longer associated when other variables were included in the model.

Discussion

Maternal health of Venezuelan women who have migrated to Colombia is of concern, particularly for those with an irregular status since they can face additional health risks, lack of knowledge about the Colombian healthcare system, scarce personal financial resources, and risks of social exclusion and discrimination (Giraldo et al., 2021; Guarnizo-Herreño and Wehby, 2021). In this community sample of 917 Venezuelan women with a history of pregnancy and delivery in Colombia between 2015 and 2021, we observed that 61.5% received at least four prenatal care visits during their last pregnancy in Colombia. This frequency of prenatal care coverage was suboptimal according to pre-2016 WHO guidelines and concerning when viewed against the revised 2016 guidelines that recommend pregnant women should have 8 contacts with their prenatal care provider (World Health Organization, 2016, World Health Organization, 2002). Comparatively, this is lower than the 81.6% (85.4% and 72.3% in urban and rural areas, respectively) estimated among Colombian women in 2021 (Departamento Administrativo Nacional de Estadísticas, 2023). Our findings are consistent with prior reports that have demonstrated consistently lower prenatal care contacts among Venezuelan mothers compared to Colombian mothers in Colombia (Garnica-Rosas et al., 2021; Guarnizo-Herreño and Wehby, 2021).

Our estimates of access to prenatal care may reflect some of the

Table 2
Associations with completion of the pre-2016 WHO recommended number of prenatal care visits (≥4 visits) among urban-residing Venezuelan refugee and migrant women in Colombia.

	Ratio of Women Completing ≥ 4 Prenatal Care Visits per Category (row %)	Prevalence Ratio	95% CI		p-value	Adjusted Prevalence Ratio[†]	95% CI		p-value
Age	N/A	1.02	1.01	1.03	**<0.001**	1.01	1.01	1.02	**0.017**
City site									
Bogotá & Soacha	195/378 (51.6%)	ref				ref			
Barranquilla & Soledad	369/539 (68.5%)	1.33	1.19	1.49	**<0.001**	1.23	1.09	1.39	**0.001**
Social network size									
Small (0–15 people)	358/591 (60.6%)	ref							
Average (16–45 people)	157/242 (64.9%)	1.07	0.96	1.20	0.235				
Large (46–200 people)	45/75 (60.0%)	0.99	0.81	1.21	0.924				
Employment status									
Formal (full and part time)	33/61 (54.1%)	ref							
Informal	209/320 (65.3%)	1.21	0.95	1.54	0.131				
Unemployed	317/520 (60.1%)	1.13	0.89	1.43	0.332				
Other (Retired, full-time student, other)	5/16 (31.3%)	0.58	0.27	1.24	0.159				
Current residence									
Stable (rent or own)	519/837 (62.0%)	ref							
Unstable	45/80 (56.3%)	0.91	0.74	1.11	0.341				
Income									
Below minimum wage	451/735 (61.4%)	ref							
Minimum wage	81/127 (63.8%)	1.04	0.90	1.20	0.597				
Above minimum wage	32/54 (59.3%)	0.95	0.75	1.20	0.652				
Migration status									
Regular	171/251 (68.2%)	ref				ref			
Irregular	393/666 (59.0%)	0.87	0.78	0.96	**0.008**	0.88	0.78	0.99	**0.028**
Migration year									
2015–2018	395/608 (65.0%)	ref				Ref			
2019–2021	169/309 (54.7%)	0.84	0.75	0.95	**0.004**	0.93	0.83	1.06	0.281
Education attainment									
Primary (no formal and primary)	79/143 (55.2%)	ref							
Secondary	346/569 (60.8%)	1.10	0.94	1.29	0.245				
Higher (higher and other)	139/205 (67.8%)	1.23	1.03	1.46	**0.022**				
Literacy level									
Low (REALM-SF<6)	94/144 (65.3%)	ref				ref			
High (REALM-SF≥6)	463/763 (60.7%)	0.93	0.81	1.06	0.279	1.04	0.92	1.19	0.534
Relationship status									
Never married	153/271 (56.5%)	ref							
Married	365/565 (64.6%)	1.14	1.01	1.29	**0.029**				
Formerly married (divorced and widowed)	46/81 (56.8%)	1.01	0.81	1.25	0.958				
Has chronic condition									
No	522/849 (61.5%)	ref							
Yes	42/68 (61.8%)	1.01	0.83	1.22	0.963				
Food security level									
No or low security	125/227 (55.1%)	ref				ref			
Very low security	439/690 (63.6%)	1.07	0.97	1.19	0.177	1.07	0.60	1.18	0.237
Denied prenatal care due to Venezuelan origin									
No	506/755 (67.0%)	ref				ref			
Yes	49/135 (36.3%)	0.54	0.43	0.68	**<0.001**	0.57	0.45	0.73	**<0.001**
Witnessed denied access to prenatal care due to Venezuelan origin									
No	490/751 (65.2%)	ref							
Yes	65/139 (46.8%)	0.72	0.60	0.86	**<0.001**				
Disrespected during prenatal care due to Venezuelan origin									
No	506/788 (64.2%)	ref							
Yes	52/112 (46.4%)	0.72	0.59	0.89	**0.002**				
Witnessed disrespect during prenatal care due to Venezuelan origin									
No	497/784 (63.4%)	ref							
Yes	59/109 (54.1%)	0.85	0.71	1.02	0.087				
Treated with empathy because of Venezuelan origin									
No	448/698 (64.2%)	ref							
Yes	105/187 (56.1%)	0.88	0.76	1.01	0.058				
Number of births while in Colombia									
1	489/798 (61.3%)	ref							
>1	75/119 (63.0%)	1.03	0.89	1.19	0.710				
Experienced psychological, physical, or sexual violence victimization while in Colombia									
No	542/873 (62.1%)	ref							
Yes	22/42 (52.4%)	0.84	0.63	1.13	0.256				

(*continued on next page*)

Table 2 (*continued*)

	Ratio of Women Completing ≥ 4 Prenatal Care Visits per Category (row %)	Prevalence Ratio	95% CI		p-value	Adjusted Prevalence Ratio[†]	95% CI		p-value
Used humanitarian resources in Colombia									
No	395/657 (60.1%)	ref				ref			
Yes	169/259 (65.3%)	1.09	0.97	1.21	0.139	1.10	0.99	1.23	0.080

[†] Final multivariable model was the most conceptually parsimonious with an AIC=1884 and mean VIF=1.09.

effects of the COVID-19 pandemic on the public's health and health system in Colombia, as in most countries globally. In Colombia, these effects included a significant increase in maternal mortality among all women, which was attributed not only to the rise in deaths directly caused by COVID-19, but also to the reduced capacity of healthcare services, which compromised effective access to prenatal care, particularly during the early and most critical periods of the pandemic (World Health Organization, 2023; Castañeda-Orjuela et al., 2023). Progress on reducing maternal mortality stalled in many countries globally with the pandemic, while a significant body of research has shown that the COVID-19 pandemic has exacerbated existing inequities, and this likely includes health inequities observed between displaced Venezuelans and the host community in Colombia (Kumar and Kumar, 2021). Ultimately, the pandemic has highlighted the importance of having more resilient health systems that can maintain effective and broadly inclusive access to health services during emergencies, thereby preventing the most vulnerable from being affected, as has been the case with pregnant refugee and migrant women.

The low coverage of prenatal care visits that we observed were also more pronounced by migration status, in which only 59% of women with an irregular migration status had completed the recommended number of prenatal visits, compared to 68% among those with a regular status. Ultimately, we found that having an irregular migration status was independently associated with having a 12% reduced likelihood of completing at least 4 prenatal care visits. Having an irregular migration status is an added barrier that limits access to health insurance and, thus, access healthcare; however, this should not necessarily be the case for prenatal care, given the policy change by the Ministry of Health and Social Protection of Colombia in 2018 that granted people with irregular migration status the ability to receive prenatal check-ups and childbirth and postnatal care (Giraldo et al., 2021; Angeleri, 2022). It is possible, that some of these pregnancies occurred prior to this policy change; however, the fact that more than two-thirds reported migrating to Colombia in 2018 or later, earlier refugees and migrants were more likely to have a regular migration status, and that this relationship persisted after adjusting for year of migration, suggests that other barriers explain this gap in coverage associated with migration status.

Prior research found that 42.4% of Venezuelan women with irregular migration status who arrived to Colombia before their first trimester had received no prenatal care between 2018 and 2019 (Fernández-Niño et al., 2019). Further, that study reported that only 22.1% of those who became pregnant after arrival received prenatal care during the first trimester (Fernández-Niño et al., 2019). Because people with an irregular status were generally not able to access health insurance during the time of this study and, thus, limited in accessing other health services because of cost, it is possible that some women with an irregular migration status assumed that the conditions would be the same for prenatal care. Additionally, qualitative research with pregnant Venezuelan women with irregular migration status in the same time period reported that even with a supportive policy environment, the unclear and burdensome bureaucratic procedures made accessibility of prenatal care difficult (Giraldo et al., 2021). Taken together, this research suggests that lack of awareness of rights to and the process to access prenatal care may limit uptake of prenatal services among displaced Venezuelan women, particularly those with an irregular status; however, these are highly intervenable areas for reproductive health providers and humanitarian organizations that support Venezuelans in Colombia.

We found that 12–15% of participants reported experiences of or witnessed discrimination on the basis of one's migration history or country of origin at across our discrimination measures. However, those who had experienced denial of prenatal care had a 42.8% lower likelihood of completing at least four prenatal care visits, which underscores the potential impact of discrimination in future attempts to access to what should be widely available prenatal care for Venezuelan refugees and migrants. These were self-reported experiences that were perceived to have been enacted on the basis of the participant's country of origin; however, as self-reported events, we do not know if they occurred explicitly as a result of xenophobia, because of lack of institutional capacity to attend to increasing numbers of patients, or due to a lack of understanding of the public health policy. The Colombian government and people have been internationally recognized for their demonstration of welcoming Venezuelan refugees and migrants, regardless of their migration status, into their country. Yet, recent polls suggest that public sentiment may be changing. In a 2020 poll, it was reported that roughly 20% of Colombians approved of their government's approach to migration policy and over two-thirds viewed Venezuelan refugees and migrants as "unfavorable", which suggest increasing stigma that may risk stalling any improvements in prenatal care that have occurred since the policy change (Edwards, 2022).

Finally, we observed noticeable differences by city of residence. While women who resided in Barranquilla and Soledad accounted for half of the study sample, they had disproportionately higher levels - almost two-thirds - of all women who received at least four prenatal care visits. The difference between the two sites could be due to the high cost of living in Bogotá or differences in communication of health access under local secretariates of health. A previous study conducted in Cartagena, Colombia reported that out-of-pocket expenses for prenatal care visits resulted in around $24.3 and potential productivity losses produced by time attending clinic visits (Alvis-Zakzuk et al., 2022). Concerns about such costs could present a barrier to prenatal care visits, particularly for women who are the sole income generator, given that over 80% of participants in our study reported having an income below minimum wage.

In early February 2021, Colombia's president, Ivan Duque, and the chief of the UN refugee agency announced that 1.7 million Venezuelan refugees and migrants who arrived before the start of 2022, including almost 950,000 identified with irregular migration status, would receive temporary protected status regardless of their migration status (Daniels, 2021). This policy change provides access to insurance and thus access to healthcare. Ultimately, it may support improved access to prenatal care among Venezuelan refugees and migrants in Colombia. Recognizing that policy change is most effective when coupled with strategic implementation, several approaches may support improved access to prenatal care among Venezuelan refugees and migrants. First, moving from an emergency humanitarian response to one that integrates refugees and migrants into the existing healthcare systems is likely to ensure sustainable and comprehensive healthcare services for refugees and migrants needing obstetric and neonatal care, as well as mitigate stigmatization of the refugee and migrant community (Castañeda-Orjuela et al., 2023). Additionally, public communication campaigns that promote prenatal care and provide information on how to access these

services, as well as navigation strategies to support engagement in healthcare may improve timely uptake of prenatal care services.

Findings should be interpreted with consideration to study limitations. The cross-sectional design of the study prevents any temporal inference of study findings. We restricted the analysis to participants who had been pregnant and delivered in Colombia; however, timing of pregnancies may vary across participants between 2015 and 2021 and there may be temporal changes that impacted access to prenatal care that were not measured. There is a possibility that some participants may have attended prenatal care visits in Venezuela prior to migrating, reducing the number of visits completed in Colombia. Additionally, there may have been different experiences during the visits in Venezuela that impact health seeking behaviors in Colombia. We attempted to account for secular changes by adjusting for year of migration, though residual confounding may persist. For participants whose last pregnancy was several years prior to study participation, responses to prenatal care questions may be limited by recall. Additionally, responses are individual self-reports; thus, structural factors and barriers were not surveyed. Finally, the parent study focused on other health outcomes; thus, survey measures related to prenatal care were limited and categorical options for number of prenatal care visits were limited to four or more visits, which prevents more discreet analysis of frequency of prenatal care contacts and limits comparison to current recommendations. However, this likely does not limit study inferences given that 40% completed <4 visits.

Conclusion

Our findings suggest that Venezuelan refugees and migrants, particularly those with an irregular status, had suboptimal prenatal care attendance even after policy change granted access to care in 2018. The barriers to accessing healthcare faced by Venezuelan refugees and migrants may overlap with those experienced by some Colombians, particularly those who are uninsured and/or low-income, live in remote rural areas, or who are from minoritized communities. They may also experience unique barriers related to awareness of rights to prenatal care and processes to access that care, including their own awareness as well as awareness among healthcare providers. Confusion related to which types of healthcare are available to people with an irregular status, or the Venezuelan community broadly, may be alleviated by more recent policy changes. To further avert suboptimal prenatal care attendance, integrating migrants and refugees into the healthcare system and developing comprehensive communication campaigns may assist Venezuelans with adapting to a different healthcare system, potentially reducing downstream costs associated with worse postnatal and neonatal outcomes.

Data availability

De-identified individual data and data dictionary will be made available upon reasonable request after approval of a proposal and signing of a data use agreement. Requests for data sharing can be sent to Dr. Andrea Wirtz (awirtz1@jhu.edu) and will be reviewed by study team members from the collaborating organizations, Johns Hopkins University, Red Somos, and the Ministry of Health and Social Protection.

CRediT authorship contribution statement

Justin Unternaher: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **José Rafael Guillén:** Writing – review & editing, Project administration, Methodology, Data curation. **Jennifer Ortíz:** Writing – review & editing, Project administration, Data curation. **Megan Stevenson:** Writing – review & editing, Project administration, Methodology, Conceptualization. **Miguel Ángel Barriga Talero:** Writing – review & editing, Project administration. **Kathleen R. Page:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization. **Jhon Jairo López:** Writing – review & editing, Project administration, Data curation. **Jhon Fredy Ramírez Correa:** Writing – review & editing, Project administration, Data curation. **Ricardo Luque Núñez:** Writing – review & editing, Project administration, Methodology, Conceptualization. **Julián A. Fernandez-Niño:** Writing – review & editing, Investigation. **Paul B. Spiegel:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization. **Elana Liebow-Feeser:** Writing – review & editing, Methodology. **Andrea L. Wirtz:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

Gratitude is extended to the thousands of Venezuelan refugees and migrants who participated in this study. This analysis would not have been possible without their participation and shared experiences. The study was implemented by a dedicated and compassionate team led by Red Somos including: Cindy Quijano, Alejandra Vela, Yessenia Moreno, Francisco Rigual, Marlon Stwar Sierra, Luis Pérez, Edwin Ferney Ramos, Edenys Rangel, Karen Marivi Vera, Valentina Calderón Giraldo, Daniel Felipe Durán Mongua, Stefanie Perdomo Martín, Paula Rincón Giraldo, Heriberto Mejía, Luder Fuentes, Jesús Javier Sandoval, Indira Fuentes, Leives Jiménez, Esther María Beltrán, Rocío Pérez, Mayra de la Cruz, Byron Gutiérrez, Oladys Bolaño, Xiomara Barrios, José Amaris Povea, Nayrimi Andreina Valbuena Castillo, Rowel Vera, José Gregorio Nieves, Hendriel Briceño, Omany Fereira, and Jesús Adelvi Rojas. We acknowledge with gratitude the support of colleagues at the US Centers for Disease Control and Prevention, Dante Bugli, Eva Leidman, Kevin Clarke, Sagarika Das, Abu Abdul-Quader; Johns Hopkins University, James Case, Kristin Bevilacqua, Sarah Arciniegas, and Wilson Gomez; and the United Nations High Commissioner for Refugees in Colombia, including Federico Duarte and Saskia Loochkartt.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jmh.2024.100273.

References

Alibhai, K.M., Ziegler, B.R., Meddings, L., Batung, E., Luginaah, I., 2022. Factors impacting antenatal care utilization: a systematic review of 37 fragile and conflict-affected situations. Confl. Health 16 (1), 33.

Alvis-Zakzuk, N.J., Díaz-Jiménez, D., Chaparro-Narváez, P., Gutiérrez-Clavijo, J.C., Castillo-Rodríguez, L., Edna-Estrada, F., et al., 2022. Substantial out-of-pocket health expenditure on prenatal check-ups: estimates from a sample of pregnant women in Cartagena, Colombia. Clinicoecon Outcomes Res. 14, 51–60.

Angeleri, S., 2022. Access to health care for Venezuelan irregular migrants in Colombia: between constitutional adjudication and human rights law. Int. J. Hum. Rights 26 (6), 1056–1082.

Arozullah, A.M., Yarnold, P.R., Bennett, C.L., Soltysik, R.C., Wolf, M.S., Ferreira, R.M., et al., 2007. Development and validation of a short-form, rapid estimate of adult literacy in medicine. Med. Care 45 (11), 1026–1033.

Avery, L., Rotondi, N., McKnight, C., Firestone, M., Smylie, J., Rotondi, M., 2019. Unweighted regression models perform better than weighted regression techniques for respondent-driven sampling data: results from a simulation study. BMC Med. Res. Methodol. 19 (1), 202.

USDA: Ballard, T.C., Jennifer, Swindale, A. and Megan, D.. Household Hunger Scale: Indicator Definition and Measurement Guide. Washington, DC.

Bitar, S. Migration in Colombia and public policy responses. United Nations Development Program Latin America and the Caribbean 2022.

Bonilla-Tinoco, L., Aguirre-Lemus, M., Fernández-Niño, J., 2020. Venezuelan migrant population in Colombia: health indicators in the context of the Sustainable Development Goals. F1000Research. 9, 684.

Castañeda-Orjuela, C., Hilarion Gaitan, L., Diaz-Jimenez, D., Cotes-Cantillo, K., Garfield, R., 2023. Maternal mortality in Colombia during the COVID-19 pandemic: time series and social inequities. BMJ Open 13 (4), e064960.
Cubides, J.-C., Peiter, P.C., Garone, D.B., Antierens, A., 2022. Human mobility and health: exploring the health conditions of Venezuelan migrants and refugees in Colombia. J. Immigrant Minor. Health 24 (5), 1281–1287.
Daniels, J.P., 2021. Colombia grants protected status to 1.7 million migrants. Lancet 397 (10276), 784.
Departamento Administrativo Nacional de Estadísticas, 2023. Estadísticas Vitales: Cifras de Nacimientos y Defunciones. Septiembre de 2023.
Edwards, N., 2022. Colombia's support for Venezuelan migrants and refugees: president Petro reaffirms commitment to integration, but continued progress requires more international support. ReliefWeb.
Fernández-Niño, J.A., Rojas-Botero, M.L., Bojorquez-Chapela, I., Giraldo-Gartner, V., Sobczyk, R.A., Acosta-Reyes, J., et al., 2019. Situación De Salud De Gestantes Migrantes Venezolanas En El Caribe colombiano: Primer Reporte Para Una Respuesta Rápida En Salud Pública, 51. Revista de la Universidad Industrial de Santander Salud, pp. 208–219.
Garnica-Rosas, L., Granich-Armenta, A., Guerra y Guerra, G., Sánchez-Dominguez, M., Lamadrid-Figueroa, H., 2021. Perinatal outcomes among Venezuelan immigrants in Colombia: a cross-sectional study. J. Immigrant Minor. Health 23 (5), 976–985.
Giraldo, V., Sobczyk, R., Fernandez-Nino, J.A., Rojas-Botero, M.L., Bojorquez, I., 2021. Prenatal care of Venezuelans in Colombia: migrants navigating the healthcare system. Rev. Saude Publica 55, 49.
Greenland, S., 1987. Interpretation and Choice of Effect Measures in Epidemiologic Analyses. Am. J. Epidemiol. 125 (5), 761–768.
Greenland, S., Mansournia, M.A., Altman, D.G., 2016. Sparse data bias: a problem hiding in plain sight. BMJ 352, i1981.
Guarnizo-Herreño, C.C., Wehby, G.L., 2021. Health of infants born to Venezuelan refugees in Colombia. J. Immigrant Minor. Health 23 (2), 222–231.
Heckathorn, D.D., 2014. Respondent-driven sampling: a new approach to the study of hidden populations*. Soc. Probl. 44 (2), 174–199.
Inter-Agency Coordination Platform for Refugees and Migrants from Venezuela. Refugees and migrants from Venezuela [updated September 5 2023,. Available from: https://www.r4v.info/en/refugeeandmigrants.
Kumar, J., Kumar, P., 2021. COVID-19 pandemic and health-care disruptions: count the most vulnerable. Lancet Global Health 9 (6), e722–e7e3.
Page, K.R., Doocy, S., Reyna Ganteaume, F., Castro, J.S., Spiegel, P., Beyrer, C., 2019. Venezuela's public health crisis: a regional emergency. Lancet 393 (10177), 1254–1260.
Stevenson, M., Guillén, J.R., Bevilacqua, K.G., Arciniegas, S., Ortíz, J., López, J.J., et al., 2023. Qualitative assessment of the impacts of the COVID-19 pandemic on migration, access to healthcare, and social wellbeing among Venezuelan migrants and refugees in Colombia. J. Migr. Health 7, 100187.
The Demographic and Health Surveys Program. Colombia DHS, 2015 - final report 2015 [Available from: https://dhsprogram.com/methodology/survey/survey-display-476.cfm.
UNICEF. Venezuela (Bolivarian Republic of): infant mortality rate 2019 [Available from: https://data.unicef.org/resources/data_explorer/unicef_f/?ag=UNICEF&df=GLOBAL_DATAFLOW&ver=1.0&dq=VEN.CME_MRY0.&startPeriod=1970&endPeriod=2023.
UNICEF. Venezuela (Bolivarian Republic of) (VEN) - demographics, health and infant mortality 2020 [Available from: https://data.unicef.org/country/ven/#/.
Volz, E., Heckathorn, D.D., 2008. Probability based estimation theory for respondent driven sampling. J. Off. Stat. 24 (1), 79.
Vu, A., Wirtz, A., Pham, K., Singh, S., Rubenstein, L., Glass, N., et al., 2016. Psychometric properties and reliability of the Assessment Screen to Identify Survivors Toolkit for Gender Based Violence (ASIST-GBV): results from humanitarian settings in Ethiopia and Colombia. Confl. Health 10 (1), 1.
Wirtz, A.L., Glass, N., Pham, K., Perrin, N., Rubenstein, L.S., Singh, S., et al., 2016. Comprehensive development and testing of the ASIST-GBV, a screening tool for responding to gender-based violence among women in humanitarian settings. Confl. Health 10 (1), 7.
Wirtz, A.L., Guillén, J.R., Stevenson, M., Ortiz, J., Talero, M.Á.B, Page, K.R., et al., 2023. HIV infection and engagement in the care continuum among migrants and refugees from Venezuela in Colombia: a cross-sectional, biobehavioural survey. Lancet HIV 10 (7), e461–ee71.
Wirtz, A.L., Page, K.R., Stevenson, M., Guillén, J.R., Ortíz, J., López, J.J., et al., 2022. HIV surveillance and research for migrant populations: protocol integrating respondent-driven sampling, case finding, and medicolegal services for Venezuelans living in Colombia. JMIR Res. Protoc. 11 (3), e36026.
World Health Organization. WHO antenaral care randomized trial: manual for the implementation of the new model. 2002 [Available from: https://apps.who.int/iris/handle/10665/42513.
World Health Organization. WHO recommendations on antenatal care for a positive pregnancy experience 2016 [Available from: https://www.who.int/publications/i/item/9789241549912.
World Health Organization. Trends in maternal mortality 2000 to 2020: estimates by WHO, UNICEF, UNFPA, World Bank Group and UNDESA/Population Division. 2023.