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Infectious diseases in migrant pregnant women from an area of the Colombian Caribbean

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RESUME

Introduction: Human migration is an activity that affects society in economic and political aspects and as a social determinant because of its differential impact on individual's health.
Objective: To describe the situation of health and infectious diseases of vertical transmission risk in migrant pregnant women from an area of the Colombian Caribbean from 2019 to 2021.
Methods: A descriptive cross-sectional study was carried out on pregnant irregular migrants in the Riohacha and Santa Marta municipalities in Colombia. Hemogram, uranalysis, toxoplasma, FTA-ABS, VDRL, rubella, hepatitis B, HIV (TORCHs), vaginal swab, basal glycemia, and transaminases, among other paraclinical tests, were done on pregnant women. Data was arranged, tabulated, and analyzed in SPSS v.23.0. A descriptive statistical analysis with measures of central tendency and dispersion for quantitative variables, and proportions analysis was done for qualitative variables.
Results: A total of 555 clinical records were analyzed. Of the infectious agents with a risk of vertical transmission, syphilis was the most frequent with 3.6%. Regarding toxoplasmosis, 2.5% were IgM-positive. 4.2% of the pregnant women had IgG antibodies against Rubella and 2 women showed antibodies against HIV.
Conclusions: Our results reflect the need for the implementation of educational, prevention, and detection health programs with the aim to decrease the number of prenatal infections in the pregnant migrant population for preventing fatal complications both in mothers and newborns.

1. Introduction

Human migration is a millenary activity that has had an economic, and political impact on societies around the world. It has also been a social determinant due to its differential impact on health throughout the life of individuals [1,2]. Approximately 4% of the world's population are immigrants and according to International Organization for Migration (IOM), most are economic migrants that do not represent a problem for host countries. However, 89 million migrants leave their origin countries for compelling reasons such as conflicts, prosecution, or disasters, which brings forced and illegal migration and causes several problems in host countries consequently [1]. In this context, an example would be the wave of Venezuelan migration that has mobilized an estimated 6 million immigrations and refugees to different countries from Latin America and the Caribbean (LAC) [3,4]. Nevertheless, Latin American countries are not entirely prepared for receiving waves of immigrants without previous consensus and coordination between governments, which causes tensions among locals to arise due to the exhaustion of public resources and especially public health resources due to the increase in treatment demand for chronic and infectious diseases, and the demand for access to prenatal care [5].

Principal destination countries for Venezuelan migrants are Colombia, Peru, Ecuador, Chile, and Brazil [3]. According to the most recent report from the Interagency Group for Mixed Migration Flows (GIFMM for its Spanish acronym), an estimated 2.48 million Venezuelan migrants and refugees reside in Colombia, and 70% are concentrated in the cities of Bogotá, Cucuta, Cartagena, Riohacha, Santa Marta, and Barranquilla and according to migratory status, 911, 714 are irregular immigrants, 50% of those are women [3,5–7].

During the pandemic, the socioeconomic, political, and health crisis that Venezuela has been through for the last decade has exacerbated violence, poverty, and massive migration of Venezuelans, allowing them to acquire conditions of informality and inequality in neighboring countries, this has driven a higher economic and social instability and has catalyzed an overflow of poverty and infectious disease of public health importance [6,8]. Furthermore, health access inequalities of

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Venezuelan migrants in comparison to Colombian residents show an association between high flows of forced migration and an increase in vaccination-preventable diseases [6].

As a response to the challenge that the Venezuelan migration wave poses to Colombia, the Colombian health and social protection ministry (Minsalud), has done adequations to public policies and norms that have allowed to: i) Permit emergency care for migrants with irregular status. ii) Allow for the health insurance of a part of this population according to their migratory status. iii) strengthen public health management in the most affected territorial entities through the response plan of the health sector for the migratory phenomenon [7]. On this basis, during the last years, an increase in healthcare services access for Venezuelan migrants has been achieved, mainly in prenatal, delivery, and postpartum care of Venezuelan pregnant women. This constitutes a public health financial and management challenge for national and regional healthcare systems [9].

Children, pregnant women, and women of fertile age in irregular immigrant conditions (individuals that enter a country without identifications and paperwork required by authorities) are particularly vulnerable due to being often subjected to traumatic situations such as sexual exploitation, abuse, and violence. Additionally, they may suffer sex-specific health risks caused by isolation and loss of access to social support systems, which may affect their health during pregnancy by lacking knowledge of their rights and access routes to the Colombian Health System [9–11].

Studies that analyze the consequences of Venezuelan migration to Colombia and other LAC countries upon vulnerable populations such as pregnant women and particularly the prenatal control of diseases of vertical transmission risk (Toxoplasmosis, Rubella, Cytomegalovirus, Herpes simplex, HIV and Syphilis-TORCHs) are still scarce, and the obstacles in healthcare due to their irregular migration status blocks them from receiving prenatal and postpartum care because of specialized medical care and laboratory diagnostic tests not being considered as emergencies [10,12]. In the context of Minsalud's support of cooperation systems with international agencies, they have committed to providing humanitarian assistance to the Venezuelan population [7]. As a result, Malteser International America (MIA) with the support of Universidad Cooperativa de Colombia (UCC), carried out research with the objective of contextualizing the health situation and determining the infectious diseases of vertical transmission risk in pregnant irregular migrant mothers from Riohacha and Santa Marta municipalities from 2019 to 2021 during the pandemic, with the aim of developing strategies for primary healthcare, active surveillance, and the promotion and protection pregnant irregular migrant's health.

2. Methods

2.1. Study area and population

A cross-sectional descriptive study was carried out with 555 pregnant irregular migrants in Riohacha (La Guajira) and Santa Marta (Magdalena) municipalities in Colombia from the years 2019–2021 the pandemic. All the participants included in this study were identified in health brigade zones with support from community action committees (JAC) and remitted to healthcare centers in agreement with MIA support institution.

2.2. Medical evaluation and paraclinical examinations

After being subjected to medical evaluation, paraclinical examinations were done on pregnant women including hemogram, hemoclassification, uranalysis, urine culture, anti-toxoplasma IgM and IgG, FTA-ABS, VDRL, Anti-Rubella IgM, Hepatitis B, HIV (TORCHs), vaginal swab, basal glycemia, transaminases, cytology, and echography. Furthermore, prenatal care follow-up was proposed according to gestation week (monthly, bi-weekly, and weekly examinations for <32, 32–36, and >36 weeks groups, respectively), and finally, mothers were assessed for different areas such as gynecology, psychology, odontology, and nutrition. Following, a micronutrient (folic acid, iron, and calcium) care plan was prescribed and delivered. Those pregnant women with clinically identified pathologies were treated and notified to Public Health Surveillance National System (SIVIGILA) by MIA-supporting healthcare institutions.

2.3. Statistical analysis

Clinical record data was stored and tabulated using Microsoft Excel and analyzed using SPSS v23.0. Descriptive analysis with central tendency and dispersion analysis was done for quantitative variables and proportion analysis was done for qualitative variables.

Regarding data of interest, nutritional diagnostic, and most frequent vertically transmitted infectious diseases were considered as response variables. Two groups of independent variables were observed: one related to sociodemographic characteristics and another related to clinical findings. The age variable was grouped into 4 categories: 12–17, 18–25, 26–35, and ≥36 years. The gestational quarter was grouped as 1 (weeks 1–13), 2 (weeks 14–27), and 3 (weeks 28–42). The nutritional diagnostic was grouped into low-weight, normal-weight, overweight, and obese categories, and blood type was grouped into AB, A, B, and O.

Bivariate associations between clinical exams and demographic characteristics were assessed using a chi-square test. Independent predictors of the response variables were evaluated using forward stepwise logistic regression that retained predictors with p-values <0.05 in the final multivariate model with the pregnant's nutritional diagnostic.

Ethical considerations. Attention and follow-up protocols of pregnants with clinical records were stored under confidentiality according to the guidelines of the 8th article from resolution N. 008430 of the 4th of October 1993 issued by Health Ministry and considered risk-free research according to Article 11[a] (ref) according to MIA and approved by Universidad Cooperativa de Colombia's bioethics committee under concept BIO102 of the 23rd of October 2020.

3. Results

Characteristics of migrant pregnant women. A total of 555 clinical records from irregular pregnants from Riohacha and Santa Marta municipalities corresponding to the years 2019–2021 were analyzed. 50.4% of the records were from Riohacha and 49.5% from Santa Marta. The mean age of pregnant women for each municipality was 23.7 and 24.5 years, respectively. The most common gestation quarter at study admission was the third quarter (28–42 weeks) with a percentage of 20.9 and 24.7 for Riohacha and Santa Marta respectively. The number of pregnancies was around 2.3 and 2.5 children with a range from 1 to 10 pregnancies. The most common nutritional diagnostic was normal weight with 22.9% for Riohacha, and 29.4% for Santa Marta, followed by overweight and obese. Regarding clinical findings, mean hemoglobin levels were 11.5 g/dL in Santa Marta and 11.1 g/dL in Riohacha with a range from 6.4 to 19.1 g/dL, glucose levels were 77.5 and 74.6 g/dL with a range from 54 to 128 g/dL. Table 1.

Findings of vertically and urinary transmitted infectious agents. Of the infectious agents with vertical transmission potential, syphilis tests were the most common with 3.2% for non-treponemal tests and 3.6% for treponemes confirmatory tests. Likewise, for toxoplasmosis, 17% of the pregnant had IgG antibodies against toxoplasmosis and 2.5% showed primary IgM antibodies. Regarding Rubella, 4.2% of the pregnant women present secondary IgG antibodies, and two were positive for anti-HIV antibodies, one was confirmed by western blot (Table 2). All the HBsAg tests were negative.

21.3% (118/555) of the 555 pregnant women presented urinary tract infections. The most frequent etiological agents were *E. coli*, *E. faecalis*, Coagulase-negative Staphylococci, *Enterobacter,* and *Trichoma vaginalis* Table 2.

Table 1
Sociodemographic characteristics of migrant pregnant women in Riohacha and Santa Marta municipalities.

Characteristics	Santa Marta				Riohacha			
	n= 275	**%**	**X (De)**	**Range**	**n= 280**	**%**	**X (De)**	**Range**
Age	275	49.5	23.7 (6.1)	13–42	280	50.4	24.5 (5.9)	14–42
Age Group (Years)								
12–17 years	36	6.5	16 (1.3)		18	3.2	16.3 (1)	
18–25 years	151	27.2	21.3 (2.15)		163	29.4	21.4 (2.2)	
26–35 years	72	13	29.2 (2.8)		82	14.8	29.6 (2.9)	
>36 years	16	2.9	38.6 (1.9)		17	3.1	37.9 (1.8)	
Gestational trimester								
1 (W1–W13)	25	4.5			48	8.6		
2 (W14–W27)	113	20.4			116	20.9		
3 (W28–W42)	137	24.7			116	20.9		
Number of pregnancies			2.3 (1.7)	1–10			2.5 (1.5)	1–9
Height (cm)	254	48.8	157 (5.9)	126–173	266	51.2	157 (6.6)	140–178
Weight (Kg)	254	48.8	63.8 (12.6)	40.5–106	266	51.2	61.4 (12.5)	36–120
CMI (Kg/Mt)	254	48.8	26.1 (4.9)	16.4–43.3	266	51.2	24.9 (4.4)	17.4–39.9
Clinical findings								
Hemoglobin (g/dL)	267	49.4	11.5 (1.4)	6,4–19.1	274	50.6	11.1 (1.3)	6.6–15.1
Hematocrit (%)	267	49.4	32.5 (4.2)	24–51.4	274	50.6	33.9 (3.4)	25.2–43.9
Basal Glicemia (g/dL)	251	47.8	77.5 (6.7)	54–101	274	50.6	74.6 (8.9)	55–129
Nutritional Diagnosis								
Low weight	14	2,7	47.2 (5.6)	40.5–56.8	13	2.5	46.8 (3.1)	40.2–50.8
Normal weight	119	22.9	56.4 (5.9)	40.9–69.0	153	29.4	55.1 (5.8)	42.7–71.2
Overweight	78	15	67.7 (6.2)	56–81	69	13.3	67.9 (8.0)	56.0–93.1
Obesity	43	8.3	83.0 (11.2)	64–106	31	6	83.9 (12.2)	63.1–119.9

Table 2
Infectious findings in pregnant migrants from Santa Marta and Riohacha municipalities.

Infectious findings	Santa Marta		Riohacha		Total	
	n = 275	%	n = 280	%	n = 555	%
Toxoplasma IgM	1	0.2	13	2.3	14	2.5
Toxoplasma IgG	22	4	72	13	94	17
Rubeola IgG	22	4	1	0.2	23	4.2
VIH (Ac)[a]	1	0.2	1	0.2	2	0.4
Syphilis treponemal test	16	2.9	4	0.7	20	3.6
Syphilis non-treponemal test	14	5.1	4	1.14	18	3.2
Urinary and vaginal infections	**n=39**	**%**	**n=79**	**%**	**n=118**	**%**
E. coli	26	22.0	27	22.9	53	44.9
Enterococcus faecalis	2	1.7	26	22.0	28	23.7
SCN	1	0.8	10	8.5	10	8.5
Enterobacter cloacae	1	0.8	8	6.8	8	6.8
***Klebsiella* sp**	6	5.1	0	0.0	5	4.2
***Citrobacter* sp**	1	0.8	0	0.0	1	0.8
***Proteus* sp**	1	0.8	0	0.0	1	0.8
Pseudomona aeroginosa	1	0.8	0	0.0	1	0.8
***Streptococcus* sp**	1	0.8	0	0.0	1	0.8
Gardnerela vaginalis	0	0.0	1	0.8	1	0.8
Candida albicans	0	0.0	2	1.7	2	1.7
Trichomona vaginalis	0	0.0	7	5.9	7	5.9

CNS: Cuagulase-Negative Sthaphylococci.
[a] confirmed by Western Blot.

Bivariate predictors of vertically transmitted infections. Laboratory diagnostic tests for Toxoplasma IgM and treponemal tests for Syphilis were found to be the most impactful predictors in the analysis. Age and glucose level variables were not found to be statistically significant predictors for toxoplasma and syphilis; however, an association was found between hemoglobin and pregnant with treponemal tests with an OR = 1.83 (CI: 0.794–4.24) but represented an insignificant magnitude based in their confidence interval, the same result was obtained for the first gestational quarter (Table 3).

A risk association was found between syphilis-infected pregnant women with an OR = 3.60 (CI:0.56–23.1) and the age group from 12 to 17 with an insignificant effect size. We found a high-risk association between gestational quarter 2 and toxoplasmosis with an OR = 6106 (CI:2.59–14477) and a highly significant effect size. On the other hand, in nutritional diagnosis an association was found between overweight and obesity regarding syphilis-infected pregnants (OR = 2.36 and 1.99 respectively), however, confidence intervals were not significant for this study (Table 3).

4. Discussion

Prenatal care is key for pregnant women's follow-up in order to prevent and early diagnose pathologies of hereditary and infectious origin whose transmission may be vertical, in this sense, clinical and laboratory interventions are mandatory for case confirmation and risk prevention during pregnancy and delivery [13].

In Colombia, few studies are focused on studying health determinants and laboratory diagnostic tests for prenatal control in irregular migrant pregnancies. Therefore, though health risks associated with infections in this population are well known, the proportion of irregular pregnancies with any type of prenatal care is unknown [2,3,7,14]. According to Hakins C, several non-government institutions have reported a high risk in irregular migrant pregnants such as anemia, low weight, diabetes, hypertension, cardiovascular disease, and sexually transmitted diseases [12,15,16]. Fernandez J et al. reported health conditions and healthcare access in migrant pregnant women of regular condition, finding a high degree of social and economic vulnerability [9].

Our study described the health situation and determined the infectious diseases with risk of vertical transmission in irregular migrant pregnants from Riohacha and Santa Marta municipalities during the years 2019 and 2021, during the pandemic. With that in mind, it is important to clarify that late start of prenatal care or not attending pregnancy controls configure risk factors associated with infections or diseases during and after pregnancy, with a risk of complication for both mothers and newborns [13,15]. In this research, we carried out an analysis of the general health conditions and routine laboratory tests in pregnancy care (TORCHS) to identify, prevent, and treat infections or the risk of infection in two municipalities from Colombia with support from MIA as a humanitarian help institution.

One of the diseases of risk for pregnants is toxoplasmosis, this is a mandatory reporting disease in many Latin American countries that

Table 3
Bivariate predictors of most common vertically transmitted diseases.

	Ref	Toxoplasma IgM			Syphilis: treponemal test.		
		P-value	OR	CI	P-value	OR	CI
Characteristics							
Age		0.799	0.93	0.55–1.58	0.755	1.04	0.806–1.34
Hemoglobin		0.156	0.216	0.02–1.79	0.155	1.83	0.794–4.24
Hematocrit		0.719	0.856	0.36–2.00	0.165	0.79	0.577–1.10
Glucose		0.609	1.06	0.85–1.31	0.918	1.00	0.93–1.08
Gestation week		0.058	1.55	0.98–2.46	0.807	0.98	0.895–1.09
Age group							
12–17 years		0.991	0.000	Inf	0.177	3.60	0.56–23.1
18–25 years	[a]	–	–	–	–	–	–
26–35 years		0.294	15.57	0.09–2632.	0.382	0.316	0.023–4.17
>36 years		0.784	3.847	0.00–5973.	0.989	0.000	0.00-Inf
Gestational trimester							
1		0.99	0.000	0.00-Inf	0.662	1.86	0.113–30.8
2		0.028	6109	2.59–14477.	0.915	1.09	0.199–6.03
3	[a]	–	–	–	–	–	–
Nutritional diagnosis							
Low weight		0.099	0.000	0.00-Inf	0.829	1.28	0.13–12.1
Normal weight	[a]	–	–	–	–	–	–
Overweight		0.782	1514	0.079–28.6	0.170	2.36	0.69–8.11
Obesity		0.478	0.261	0.006–10.7	0.436	1.99	0.35–11.3

[a] Ref. CI: Confidence Interval.

could cause neurological and visual sequels to pregnant women, and hydrocephaly, microcephaly, intracranial calcification, retinochoroiditis, strabismus, blindness, epilepsy, cognitive and psychomotor deficiency, thrombocytopenia-caused petechia, and anemia in newborns, therefore making its screening essential during pregnancy [17,18].

In this study, we found a seroprevalence of 17% (94/555) for anti-toxoplasma *gondii* IgG antibodies and 2.5% for IgM respectively, observing the second quarter of pregnancy as a significant risk factor (Table 3). In a meta-analysis done by Rostami A et al., in 2020, estimated a global IgG prevalence of anti-Toxoplasma *gondii* antibodies of 33.8%, while, in the case of Latin America the seroprevalence was found to be 61.2, 50.6, 35.8, and 33.7% for Brasil, Colombia, Venezuela and Argentina respectively [19]. Considering the variability of toxoplasmosis seroprevalence around the world, and that the population studied by Rostami et al. were women with formal access to healthcare, there is a high probability that cases are underestimated in pregnant women that do not seek healthcare due to their irregular condition.

On the other hand, some factors associated with the risk of T. *gondii* infection are related to socioeconomic status, such as age, multiparity, socioeconomic stratum, gestation week, and climate factors like precipitation or rainfall, and pet ownership [19–21]. In our study population, we evidenced gestation weeks to be a risk factor, specifically in the second quarter with an OR = 6109 (CI:2.59–14477). According to Chaudhry et al., the risk of fetal transmission is less than 6% at the start of gestation, while the transmission rates vary from 60 to 81% at the third quarter of gestation [18,22]. Despite the prevalence reported in our study being lower than reports from other authors, it can be appreciated that the risk of infection and prevalence varies according to regions and the accessibility to healthcare services [19,23].

Syphilis is another disease that can affect the fetus through the transplacental route or during delivery via contact with an active lesion. It is associated with abortion and the development of congenital syphilis when the infection is acquired during the first months of gestation [24]. The World Health Organization (WHO) reports that approximately 1.5 million pregnant women are infected with syphilis in the world annually and that 36% of untreated pregnant women present complications such as congenital syphilis, 26.4% fetal death, 23.4% low birth weight, 23.2% premature delivery, 16.2% neonatal death and 14.9% abortion [25]. The National Institute of Communicable Diseases of South Africa reported high rates (1.1%–4.6%) of syphilis among pregnant women [26]. According to data from the National Institute of Health in Colombia (INS), from 2012 to 2018, increases in the prevalence ratio of gestational syphilis from 6.2 to 8.5% and an increase in incidence rates of congenital syphilis from 1 to 2.65% were reported [27,28].

Again, our analyses showed a different behavior of 3.2% (18/555) for nontreponemal tests and 3.6% (20/555) for confirmatory treponemal tests, and the prevalence ratio was lower than the data reported by INS. In addition, the 12–17 years age group and first-time pregnant women were determined to be a risk factor for infection by *Treponema pallidum* (Table 3); however, no statistical significance was found due to the small size of the studied population. Another important data we found was hemoglobin with an OR = 1.83 (CI: 0.79–4.24), although there was no statistical significance due to the limited population size and the limited information available from the medical records, according to some authors, fetal anemia is considered as a risk factor for the severity of infection [29–31].

Regarding rubella infections, the greatest public health impact is the fact that it increases the risk of spontaneous abortions, stillbirths, and congenital anomalies (Congenital Rubella Syndrome, CRS) when a woman becomes infected during the first trimester of pregnancy [32]. PAHO reported 84 confirmed cases of rubella in eight countries in the Region of the Americas between 2010 and 2019 and 16 cases of congenital rubella syndrome, three in Canada, 13 cases in the United States, and 7 in Colombia all imported or related to importation [33].

In our population of pregnant women, 4.2% (23/555) of IgG antibodies were found. These data suggest that the individuals who participated in the study were exposed to the rubella virus or presented immunological memory antibodies due to vaccination, which can be confirmed, because by 2015, following the first wave of Venezuelan migration, the International Committee of Experts (CIE) through documentation and verification for the elimination of Measles, Rubella, and Congenital Rubella Syndrome in the Americas prompted governments to implement action plans for the sustainability of the elimination of rubella and congenital rubella syndrome through access to vaccination and antibody titer services, care for people in a state of vulnerability, epidemiological surveillance, and finally, the implementation of an immunization plan for the migrant population at high-transit borders, prioritizing the population at risk, both migrants and residents of municipalities that host these population groups [33].

In relation to Hepatitis B, we found no positive cases. However, it is important to highlight the positive impact of vaccination in reproductive-age women as a strategy for strengthening prevention and reducing the risks and frequency of the disease as well as vertical

transmission [34].

Another test performed during prenatal care was HIV screening. Colombia has the fourth highest prevalence rate of HIV/AIDS among Latin American countries with an estimated prevalence of 0.7%. In our study population, 2 pregnant women showed antibodies against HIV, and one was confirmed by Western Blot. Therefore, it is important to highlight that the migratory flow contributes to the expansion of the HIV epidemic in Colombia and other Latin [10,35,36] Because of this, diagnosis is crucial for taking measures that allow the determination of the greatest number of pregnant women and in turn, administer antiretroviral treatment in order to achieve undetectability in the last four weeks of gestation or close to delivery to ensure the lowest possible risk of transmission at the time of delivery and immediate management of the newborn; as well as prohibit breastfeeding by ensuring artificial lactation [37]. WHO and PAHO have focused their attention on the association between migration and HIV, highlighting that it is a complex relationship. For this reason, it is necessary to implement measures that allow an adequate and timely diagnosis that guides the development of strategies and public policies aimed at mitigating the transmission of this disease [38].

At the same time, urinary tract infections (UTI) continue to be one of the most common medical conditions complicating pregnancy, representing a prevalence of 20% regardless of being symptomatic or asymptomatic [39]. The prevalence of UTI in our study was 21.3%. All the pregnant women were found to be asymptomatic, these data differ from those presented by Faidah et al. and Balachandran et al. who found 8% and 11.8% of pregnant women to be asymptomatic, respectively [39,40]. Although no association could be made between UTI, delivery, pyelonephritis, and preeclampsia due to the lack of information in the medical records, several authors mention that receiving antibacterial treatment reduces the risk of pyelonephritis and low birth weight and the risk factor is minimal for pregnant women with preeclampsia [40–42]. In this study, 12 infectious agents causing UTI were identified, with *E. coli* and *E. faecalis* as the main isolates (Table 2). These isolates are similar to those reported by several authors who demonstrated that *E. coli* and other gram-negative isolates (i.e., *Klebsiella* species, *Acinetobacter baumanni*i and *Proteus mirabilis*) were responsible for 70%–80% of UTIs in pregnancy and gram-positive microorganisms (e.g., *Enterococcus faecalis*) in approximately 10% of UTIs in pregnant women.

5. Conclusions

This study had a remarkable social and health impact in the detection of infectious diseases in irregular migrant pregnant women, that were residents of two municipalities of high migratory transit to avoid complications in pregnant women, by approaching the prevalence of these vertically transmitted diseases and the implementation of public health strategies to control these diseases through screening tests that allow timely diagnosis and effective treatment.

Thanks to the type of general system of social security in health (S.G.S.S.S.S.) of the country and the strategies offered by Non-Governmental Organizations (NGOs) such as Malteser International America, the need to implement health education, screening, and prevention programs in order to decrease the cases of prenatal control infection in the migrant pregnant population to prevent fatal complications in both mothers and newborns was demonstrated.

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Ethics committee approval

This proposal was approved by the bioethics committee of Universidad Cooperativa de Colombia under concept BIO102 on the 23rd of October 2020.

CRediT authorship contribution statement

A. Rojas-Gulloso: Conceptualization, Methodology, manuscript drafting, Data curation, formal analysis. **L. Sánchez-Lerma:** Conceptualization, Writing – original draft, Formal analysis. **Marcela Montilla:** Formal analysis, Writing – original draft. **F. Morales-Pulecio:** Investigation, Project administration, Santa Marta. **E. Sarmiento-Rudolf:** Investigation, Project administration, (Riohacha). **Ricardo Tapia-Reales:** Funding acquisition, Supervision.

Declaration of competing interest

The authors state that they have no conflicts of interest to declare. The authors alone are responsible for the content and writing of the paper.

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