Pregnant women's perceptions on information sources on Zika virus: a qualitative study

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Abstract: The Zika virus (ZIKV) epidemic had a sanitary, psychosocial, and economic impact on individuals of reproductive age. The primary concern revolved around infection during pregnancy due to possible vertical transmission and its association with adverse fetal and infant outcomes, known as Congenital Zika Syndrome (CZS). This qualitative study employs phenomenology and grounded theory. This study includes interviews with 98 women, some pregnant during the ZIKV epidemic in Brazil, Colombia, and Puerto Rico, who had children with CZS or without diagnosed neurological impairment. Additionally, the study included a group of women who were pregnant during the Covid-19 pandemic in these same countries. In both groups, interviewees had varying levels of knowledge about ZIKV. The study found that messages conveyed through the media tended to be alarmist, in contrast to the information provided by healthcare professionals, which was considered more trustworthy. Pregnant women during the ZIKV epidemic reported receiving their ZIKV and CSZ infection diagnoses late, either during or after childbirth. The study underscores the needs of pregnant women in high-risk scenarios, the importance of health education processes, and the necessity to reinforce communication and continuing education.

➤ **Keywords:** Zika Virus. Sources of Information. Pregnant Women. Microcephaly. Covid-19.

Introduction

The Zika Virus (ZIKV) epidemic, that heavily hit Brazil and almost all countries on the American continent, mainly between 2015 and 2016, had a tremendous impact on women of reproductive age (Lowe *et al.*, 2018). The primarily concern with ZIKV infection during pregnancy is the risk of vertical transmission, potentially resulting in adverse fetal and infant outcomes and children born with Congenital Zika Syndrome (CZS) (Pomar *et al.*, 2018; Melo; Aguiar *et al.*, 2016; Melo; Malinger *et al.*, 2016).

The Covid-19 pandemic, which began in late 2019, posed significant challenges on a global scale and also impacted pregnant women since pregnancy is a risk factor for Covid-19 development (Phoswa; Khaliq, 2020; Smith *et al.*, 2023). While asymptomatic or mildly symptomatic pregnant individuals may not require major interventions, pregnant individuals with pre-existing conditions tend to experience unfavorable outcomes. The same pattern can be observed in neonates born to infected mothers. In light of these impacts, it is evident that Covid-19 in pregnant women represents a serious public health issue (Souza *et al.*, 2020).

Both the health emergency arising from ZIKV (2015-2016) and the Covid-19 pandemic (2019-2023) have been characterized as periods of uncertainty regarding

the potential health effects of these diseases on pregnant women and fetuses (Souza; Amorim, 2021), therefore, studying the knowledge and perceptions of this group during the health emergency is relevant. So, this qualitative exploratory research was conducted with 98 women who experienced the two periods mentioned, one group being pregnant during the ZIKV epidemic and another group being pregnant during the Covid-19 pandemic.

Specifically, this article seeks to discuss the sources of information used by these women to find out about ZIKV during the two health emergencies (ZIKV and Covid-19). This paper differs from other studies produced so far because it included populations from three different countries (Brazil, Colombia, and Puerto Rico) and different pregnancy outcomes (mothers of children with CZS and apparently non-affected children) since the previous studies are mostly focused on a population group (mothers of children with CZS, or infected pregnant women) from a specific location or region.

It is known that the control and prevention of ZIKV infection includes multisectoral strategies and, for those strategies to be effective, collaboration between public authorities and civil society is required. Among these, vector control and prevention of mosquito bites (Marbán-Castro *et al.*, 2021) seem to gain prominence. Therefore, studies indicate that the response to ZIKV was predominantly biomedical, and the social sciences were considered a low priority, despite their relevance (Passos *et al.*, 2020).

This research aims to reaffirm that measures to control health emergencies should go beyond, including safe access to sexual and reproductive health and rights (SRHR) to avoid unintended pregnancies during epidemic peaks and access to safe abortions in case of unintended pregnancies or those presenting congenital anomalies, for example. It is also necessary to invest in basic sanitation, garbage collection, and rainwater drainage in urban centers (Santos *et al.*, 2016).

Regarding the sources of information used by pregnant women, studies on the ZIKV epidemic conducted so far revealed that there were different behavioral patterns associated with the media, including avoidance (unwillingness to seek additional information) or looking for more information (asking questions to healthcare providers or via the Internet) (Marbán-Castro *et al.*, 2020). In addition, other sources of information, such as support groups, are mentioned (Laza-Vásquez; Gea-Sánchez; Briones-Vozmediano, 2021).

This research aims to address the sources of information used by the two above-mentioned groups of women from three different countries to obtain information about ZIKV during two different periods, the ZIKV epidemic and the Covid-19 pandemic. This article intends to deepen previous studies by presenting the sources of information used in each country, the most reliable ones, the feelings associated with access to information and what are the predominant actions taken by interviewees in light of the information obtained. In this context, the research pretends to compare experiences across the three countries to understand and explore the possibilities for health emergency scenarios.

This article is part of a series of articles produced by the Zika virus Social Sciences Working Group (ZSSWG) within the global Consortium of Zika (Wilder-Smith *et al.*, 2019).[1]

The context in the three countries during the ZIKA virus epidemic and during the Covid-19 pandemic

The political, cultural, and socioeconomic landscapes of the three countries underwent significant changes during the ZIKV epidemic and the subsequent Covid-19 pandemic. Parallel and distinct aspects can be highlighted, mainly in relation to the situations in Brazil and Colombia. Puerto Rico faced unique challenges that shaped its response to these health crises.

The ZIKV epidemic unfolded in a scenario of instability in Brazil. In 2013, the country experienced a gigantic mass movement (Pinheiro-Machado; Freixo, 2019), revealing a crisis in democratic representation at the time (Fernandes, 2019). The following year, the presidential elections were polarized and hotly contested, with Dilma Rousseff securing her second presidential term (Pozzebo, 2014). Also in 2014, the first cases of an unknown disease, causing physical experiences and symptoms that appeared and disappeared within a few days, spread throughout northeastern Brazil (Diniz, 2016).

After the elections, President Rousseff lost the support of her political base (Fernandes, 2019) and the government became the focus of corruption investigations (Pinheiro-Machado; Freixo, 2019). During this period, in November 2015, the Ministry of Health declared the Zika virus epidemic a Public Health Emergency of National Importance (PHEIC). Following the declaration, a special task force was

established by the Health Emergency Operations Center. The rapid accumulation of cases – more than a thousand cases in November and December 2015, a number that quickly rose in the first quarter of 2016 – and their visibility in the media, heightened women's fears and feelings about a potential ZIKV infection.

During the epidemic, in 2016, President Rousseff suffered a parliamentary coup that resulted in her impeachment. After that, the Vice President implemented an intense economic austerity program (Pinheiro-Machado; Freixo, 2019) and promoted negative social changes with socioeconomic impacts (Fernandes, 2019). The period was characterized by the strong presence of conservative groups in both parliament and society, as well as the strengthening of the Armed Forces (FA) (Pinheiro-Machado; Freixo, 2019), which facilitated the election of former army captain Jair Bolsonaro as president in 2018.

While in power, Jair Bolsonaro implemented a "democratic minimalism" and pursued his "socially conservative and economically neoliberal agenda" (Silva; Rodrigues, 2021). The Public Health Emergency of International Concern (PHEIC) resulting from Covid-19, did not alter this characteristic.

During the Covid-19 pandemic in Brazil, the promotion of physical distancing measures, the use of masks, among others, was insufficient. Furthermore, the coordination of measures to protect the economy, employment, and social welfare was also inadequate (Machado; Pereira; Freitas, 2022). Although mass vaccination was already scientifically considered one of the main measures capable of controlling Covid-19 mortality (OPAS; OMS, 2020), the Brazilian State promoted distrust in vaccines and the efficacy of early treatment (Senado Federal, 2021). In this scenario, once again, pregnant women found themselves in a vulnerable position, as Brazil accounted for eight out of every ten maternal deaths due Covid-19 worldwide (Nakamura-Pereira *et al.*, 2020). As a result, the country has 708,021 deaths (Brasil/MS, 2023).

The ZIKV epidemic in Colombia reached its peak in 2016, just as President Juan Manuel Santos and the *Fuerzas Armadas Revolucionarias de Colombia* (FARC) guerilla signed the Peace Accord, putting an end to more than 50 years of conflict (Colombia, 2016). In this context, the Santos government had a divided country, those who were in favor and accepted the terms of the peace accord, and those who opposed negotiations with an illegal organization. Despite the divided opinions, the country began to see a positive impact after the peace accord, with the reduction of

massacres, homicides and kidnappings, opening the possibility of increasing social investment (Uni-Chilito, 2021).

Following the announcement of the presence of ZIKV in the country and framing it as a Public Health Event of international concern, the country`s public health authorities initiated an action plan to enhance ZIKV surveillance with an emphasis on pregnant women and the detection of central nervous system birth defects (INS, 2022).

Educational interventions among the population focused on prevention of mosquito bites and improving early initiation of prenatal care. Women were especially targeted in these communication campaigns and by mid-2016, Colombia recorded a 6% birth rate reduction, sustained through 2017 (Gamboa, 2018), considered as an indirect effect of the ZIKV epidemic and how health risks were communicated.

The Covid-19 pandemic evolved during the government of Ivan Duque, a highly criticized president with increasing social unrest especially during the first two presidential years (CNN, 2018). By the end of 2019, massive anti-government protests were registered across the country, threatening a national strike (DW, 2019).

Just as the country was experiencing an intensifying social conflict, the Covid-19 pandemic was declared. In March 2020, strict pandemic preventive measures were ordered. These measures included restrictions on the mobility, granting only 34 reasons to travel in public places such as access to health services, grocery shopping, attendance at workplaces for health professionals and workers related to the sale and distribution of food. Exit and entry to cities and municipalities was restricted and, in some populations, people's mobility was restricted according to their gender or identity card number as additional measures aimed at improving improve compliance with the confinement. Schools and universities were closed, and virtual class attendance was initiated (Parlamento Andino, 2021).

Strict measures were maintained for more than 3 months, with a gradual reactivation of social and economic activities. Covid-19 vaccination began in March 2021 and in August 2021 for pregnant women, starting from the 12th week of pregnancy. One month after the start of vaccination in pregnant women, 51,914 women had received a first dose, with increasing numbers given a tendency of high vaccine compliance in this population. Although pregnant women were given priority during the Covid-19 pandemic, restrictive measures affected the quality and frequency of prenatal care, increasing the vulnerability of mothers and their

newborns (Colombia, 2021). By December 2023, nearly 142,780 deaths from Covid-19 had been recorded in the country (INS, 2023).

The ZIKV epidemic in Puerto Rico occurred against a backdrop of economic uncertainty and political complexity. The island had been grappling with a financial crisis for several years, leading to austerity measures and increased public discontent (Ruiz, 2022). The first cases of the ZIKV emerged in 2016, adding another layer of concern to an already precarious situation. The government declared a public health emergency, intensifying efforts to control the spread of the virus and protect vulnerable populations (Puerto Rico, 2023).

While Puerto Rico struggled with the ZIKV epidemic, there were tensions over the political status of the island, which it is an unincorporated territory of the United States of America (USA). As a result, debates about statehood, independence, or the preservation of this status added complexity to the crisis response. The government's effectiveness in addressing public health issues became intertwined with broader discussions about governance and autonomy.

During this time, Puerto Rico experienced a hurricane season marked by the devastation of Hurricane Maria in 2017. The natural disaster exacerbated the challenges posed by the Zika virus, overwhelming healthcare infrastructure and hindering response efforts (Rodríguez-Días *et al.*, 2017). The intersection of environmental and health crises underscored the island's vulnerability to multiple simultaneous challenges. In the aftermath of Hurricane Maria, Puerto Rico's political landscape experienced shifts. Calls for greater autonomy and self-determination gained momentum, shaping the discourse around the island's recovery and future (Cabán, 2009). The resulting changes influenced how the government approached public health crises and laid the groundwork for responses to future challenges.

With the Covid-19 health emergency, the socio-economic disparities of the island became more pronounced as marginalized communities were the most affected (García *et al.*, 2021). The government, recognizing the link between health and economic stability, implemented measures to mitigate the impact on vulnerable populations. Debates about the political status of the island persisted, affecting the distribution of resources and the effectiveness of public health interventions. The government's response to the pandemic reflected not only its commitment to public health, but also its recognition of the broader societal implications of the crisis (Pérez-Ramos; Garriga-López; Rodríguez-Díaz, 2022).

In conclusion, Brazil, Colombia, and Puerto Rico faced different challenges during the Zika virus epidemic and subsequent Covid-19 pandemic, with unique political, cultural, socioeconomic contexts, and climatic events. While each country had its specific challenges and responses, communication played an essential role in shaping their experiences during public health emergencies, which will be further explored in this research.

Methods

Study design, sites, and population

This is a qualitative study based on Phenomenology and Grounded Theory.

Phenomenology is an approach used in qualitative research to understand first-hand experiences of those individuals involved in the phenomenon or even of interest. This approach is particularly useful to explore complex and sensitive topics (Thyer, 2010).

Grounded Theory is an inductive and deductive method that involves systematic yet flexible guidelines for collecting and analyzing qualitative data with the goal of constructing "grounded" theories from the data itself (Charmaz, 2006). According to this method, generalizations emerge from the data collected rather than being assumed before the analysis is conducted (Glaser; Strauss, 1999). In other words, the data form the basis of the theory, and the analysis of the data generates the concepts to be constructed.

The choice of Grounded Theory is motivated by the way the method allows for a detailed analysis of the data and its categorization, allowing the participants' statements to be the source of the categories and to engage with the existing literature. In this sense, it aligns with phenomenology by prioritizing the experiences of the individuals involved.

This research was generated by the Zika virus Social Sciences Working Group (ZSSWG) within the global Consortium of Zika (Wilder-Smith *et al.*, 2019) and took place in three different countries, and seven different sites (Campina Grande, Recife, and Rio de Janeiro in Brazil, Bucaramanga, Barranquilla and Neiva in Colombia, and Island-wide in Puerto Rico).

These three countries were chosen because the northeastern region of Brazil was the first region in Latin America to report cases of the Zika Virus.

Additionally, Brazil, followed by Colombia, are the countries that have recorded the highest number of Zika cases between 2014 and 2023 (OPAS, 2023). On the other hand, although located in Latin American, Puerto Rico is a U.S. territory, so its healthcare system and the strategies they are using are different from other countries in the region.

The method aimed to understand the experiences of pregnant women with sources of information about Zika virus during the Zika virus epidemic and the Covid-19 pandemic, considering their differences and similarities across the territories. The research is comprehensive in nature, covering various topics, and this article specifically focuses on the selection of statements regarding sources of information.

Participants were adult women (aged 18 years and older) living in areas endemic for Aedes Aegypti mosquito-borne diseases. The first group consists of pregnant women during the ZIKV epidemic (from early 2015 to the end of 2016) in their country. This group is subdivided into women with a presumptive clinical or confirmed laboratory diagnosis of ZIKV infection who had a child with a clinical profile compatible with CZS, and women who had a normocephalic and apparently healthy child at birth. The second group consists of women who were pregnant during the Covid-19 pandemic (July 2020 to July 2021) and were not pregnant during the ZIKV epidemic.

In both cases, the topic of discussion during the interviews was ZIKV. All the interviews were conducted between June 2020 and November 2021. Participants were identified through health clinics, government services, and community-based organizations in Puerto Rico; through the Zika cohorts in Colombia, and Campina Grande, Brazil, and through mothers' organizations in Rio de Janeiro and Recife, Brazil. A minimum sample size of 10 participants across all sites was defined based on the experience of previous studies to reach the saturation point and theoretical saturation.

Through interviews, the research aims to understand the source of information used by the three groups of women to gather information about the ZIKV. Subsequently, the study seeks to understand the perceptions of these women, in these different countries and historical periods, regarding ZIKV. Furthermore, the research aims to explore the emotions and actions of these women in response to access (or lack of access) to information.

Data collection and analysis

Interviews and transcriptions were carried out by local teams in their native language (Portuguese or Spanish). This was a multi-country analysis with a multidisciplinary team that met on a weekly basis for transcript cleaning, quality control, and analysis. The transcripts were imported into the Dedoose® software (SocioCultural Research Consultants, LLC, Manhattan Beach, CA, USA).

The transcripts were thoroughly read, coded, organized, and categorized by the research team using the Dedoose® software. Codes were generated before and during the analysis using an inductive and deductive process. From the co-concurrence of codes, and based on our research questions, themes and discussions were constructed and major conclusions emerged. Consensus on codes and emerging themes was reached in meetings with the entire research team. The research began without a pre-existing hypothesis. Pre-existing conceptualizations were used only to define deductive codes. However, inductive codes were also used to allow a theory to emerge inductively from the data. Data collection and analysis followed a systematic and circular approach. Theory generation was based on comparative analyses of the data collected from different participants, different profiles, contexts, and countries. The methodological approach aligns with the Grounded Theory (Corbin, 1998).

This study was approved by the Human Research Ethics Committees under the numbers CAAE: 16435819.1.0000.5240 for Brazil, CEIB 2583-2019 and CEMIN No 20-2020 for Colombia, and IRB00010793 for Puerto Rico. Participants provided written consent for interviews and audio recordings. All names were deleted from the transcripts to ensure subject anonymity. Data were analyzed anonymously.

Results

Participant profiles and common results

Ninety-eight women participated: 38 from Brazil (BR), 39 from Puerto Rico (PR), and 21 from Colombia (CO), with an average age of 31 years. Of the total number of participants, 34.7% had a child with at least one clinical finding compatible with signs of CZS, which we refer to by the acronym "PREGDURZIKA_CZS" meaning pregnant during the Zika epidemic and with a child diagnosed with CZS; and 45.3% had a child without clinical findings compatible with signs of CZS, which we identified by the acronym “PREGDURZIKA”, and 20.0% were

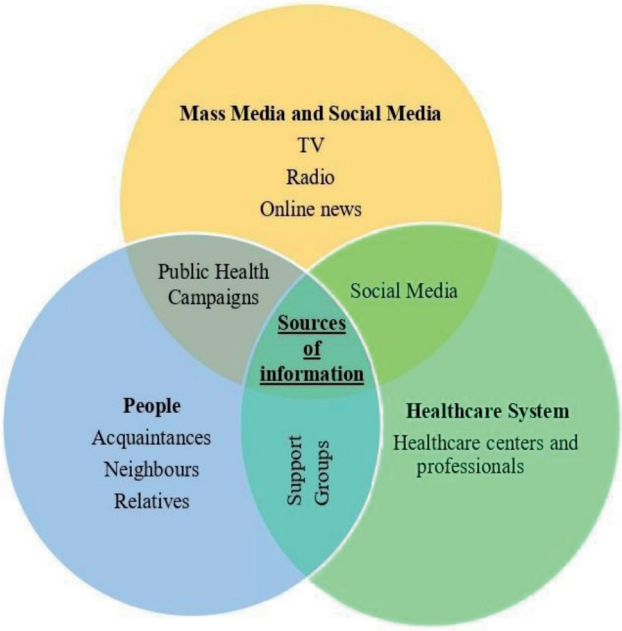
pregnant during the Covid-19 pandemic, which we identified by the acronym "NOPREGDURZIKA". Table 1 below shows the socio-demographic profile and distribution of participants by country.

Table 1. Socio-economic characteristics and distribution of population

Characteristic	Number of Participants / %			
	Brazil (n=38)	**Colombia (n=21)**	**Puerto Rico (n=39)**	**Total (n=98)**
Mothers of children with CZS	21 (55%)	11 (52%)	8 (21%)	40
Mothers of children without CZS	10 (26%)	7 (33%)	16 (41%)	33
Pregnant during Covid-19, not pregnant during ZIKV epidemic	7 (18%)	3 (14%)	15 (38%)	25
Average Age	34	29	30	31
Level of education				
Graduate	18 (47%)	7 (33%)	22 (56%)	47
Undergraduate	0 (0%)	10 (47%)	7 (18%)	17
High School	13 (34%)	4 (19%)	8 (21%)	25
Primary Middle-School	7 (18%)	0	2 (5%)	9
Marital Status				
Married	18 (47%)	7 (33%)	16 (41%)	41
Cohabitating	16 (42%)	8 (38%)	17 (44%)	41
Single	4 (10%)	5 (24%)	6 (15%)	15
Divorced	0	1 (5%)	0	1

It was found that in all three groups, three sources of information were mentioned, being mass media and social media, the healthcare system, and people in general.

Figure 1. Most common sources of information used to get informed about ZIKV by all interviewees during the epidemic (2015-2017)



Each information medium has its own peculiarities and different ways to communicate. Therefore, we analyzed the most used, the most reliable, the feelings associated with access to information, and, finally, the main actions taken by the interviewees in light of the information they obtained.

Sources of information used by pregnant women during the ZIKV epidemic

In all countries, television was the most frequently cited source of information, followed by the Internet and healthcare professionals. Support groups, community, and radio were also reported as sources of information about ZIKV. Table 2 reflects the experiences of pregnant women during the ZIKV epidemic in the three countries where interviews were conducted.

Table 2. Experiences of pregnant women during the ZIKV epidemic in 2015-2016 regarding sources of information used to learn about ZIKV.

Topics	Brazil	Colombia	Puerto Rico
Sources of information	Television, health centers, internet, radio, neighborhood	Television, social media, internet, and healthcare professional	News on the television (press), posters, public health campaigns, governmental offices, hospitals, healthcare professionals, university, social media, and friends.
Time of Zika diagnosis	After birth or during pregnancy	After birth or during pregnancy	During pregnancy, as part of a positive testing during their pregnancy and at a clinic visit. As part of a prenatal classes.
Information heard about ZIKV	It would be the same as dengue fever, ignorance about microcephaly. Causes microcephaly or impairs child development.	That some babies were being born with microcephaly, but it was not sure if it was associated with Zika. Some women knew that affected children could develop seizures, paralysis, and other severe defects.	That you get it from the mosquito bite. To get protection from the mosquito. There is a virus that causes pregnancy complications and defects to the fetus. That some babies were being born with head problems, that it was very dangerous.
Feelings and emotions	Insecurity, uncertainty, anguish, and anxiety. Affirmation that the information was also confused. Fear of seeking information.	Depressed, uncertain, confused. Affirmation that the information was confused. Fear of seeking information.	Fear, worried, tense, confused, unclear.
Behaviors	Used repellent and long clothing. Paid attention to the environment.	All participants, except one, sought health care to get diagnosed for Zika once they stopped looking for information about Zika, others looked for more.	Some women stayed inside during the night or early morning, wore long clothing and used repellent to avoid mosquitoes' bites.

Types, reliability, and feelings related to information access

The reliability of the information provided by television seems to be high, however, there is criticism of the way in which the information is presented, for being excessive, lacking in depth, and contradictory. In Colombia, interviewees expressed that the news focused mainly on microcephaly and birth defects. Similar experiences were shared in Puerto Rico and Brazil, where some participants indicated that some press tended to be alarmist and sensationalist.

> A - Perhaps the press tends to be a little more alarmist or sensationalist or is less informative and more alarmist. Because if they give me, like that, information about things that I can do to, to protect myself or to prevent a mosquito from biting me or whatever, then I kind of get it more than if they give me the numbers and show me the pictures and everything that can happen and that kind of thing. (PR_PREGDURZIKA)

Regarding the feelings associated with the media and the way in which the information was transmitted, the massive way in which television informs is associated with feelings of nervousness, worry, and anxiety.

> A - Ah, I was very sad, I cried a lot, because I saw on TV how it is, the other people who have microcephaly, but it wasn't from Zika, right, it was something else right, that was born, then I was very sad, but after [name of child] was born, I saw his face, it was all perfect, I was happy. (BR_PREGDURZIKA_CZS)

> A - And at that time, [...] I was already pregnant. [...] it was very heavy, it was every day on the news, and it was horrible. (BR_PREGDURZIKA)

The Internet and social media were frequently reported as a source of information in all three countries but appear to be a secondary means of information. WhatsApp was mentioned in only two interviews:

> A - Actually, it was the end of 2015, yes, I believe it was the end of October, more or less, [...] people started to talk about Zika. And then, I remember that in WhatsApp groups, even my cousins said "Oh, everyone be safe, it is not the time to get pregnant, because there is this problem and children are being born with microcephaly and everything". (BR_PREGDURZIKA)

The way in which information is disseminated on the Internet was criticized by the interviewees. According to three women from Brazil, when they researched the subject on the Internet, frightening images appeared, causing fear and false impressions.

> A - [...] at that first moment the information that reached us about microcephaly, when we searched for information even on Google, there were absurd scenes [...] but we saw absurd things on the internet, when you put it like that, pictures or images of children with microcephaly, there appeared that barrage of images that you, I myself spent sleepless

> nights when I accessed it, imagine a person who does not have so much mental balance, who does not have a good family structure, I think it must have further aggravated the situation of these people right, very discouraging. (BR_PREGDURZIKA_CZS)

In Puerto Rico, women emphasized that there were public health education efforts everywhere (hospitals, bus stops, school doors, etc.) with messages focused on preventive measures to avoid mosquito bites. This type of efforts was not mentioned by the interviewees from Brazil or Colombia.

> My gynecologist, my gynecologist said so. I saw it in a lot of promotions because there were a lot of bulletin boards everywhere. The bus stops, the hospitals, on the door of the schools. Everywhere there was a sign that said ZIKV and protect yourself, use OFF. That's where I got scared. (PR_PREGDURZIKA_CZS)

At least two women in Brazil mentioned "support groups" as a source of information and help after having a child with CZS. For one interviewee, the groups are seen as a place of care that is not primarily focused on medical care for affected children. A space to talk about suffering and difficulties and to expand the support network.

> A – So, I participate in the mothers' group, yeah ... of Lótus, from Rio, which I forget the name, and is from Fernandes Figueira [Brazilian hospital], and we sometimes exchange some information, and the physiotherapies of [name of child] also from Rio [...] are the special mothers of Caxias, which here is very difficult for mothers, this interaction, talk about their problems, and then this was very good, because I brought this from Rio to here through the groups that I participated in there in Rio, so I was able to expand this a little, to show mothers that they can talk, that we can exchange ideas, that it is not a shame to have special children, so I was able to show a little here for the mothers, then I created this group, which today is a relatively group, it is not big, but it is a good group here in Caxias, and there is a good exchange. (BR_PREGDURZIKA_CZS)

Reliability of information sources in times of uncertainty

As mentioned in the background, during a period between 2014 and 2015, the link between ZIKV infection and potential damage to fetal development was not yet known but was confirmed in November 2015.

> A - During pregnancy we heard about cases, right. Actually, it was a "novelty", we already knew about Dengue, there were already cases of Chikungunya and at that time this new disease appeared, which was also transmitted by the Aedes Aegypti [...] (BR_PREGDURZIKA)

Many women report this period of confusion, related to media coverage and the way they were treated in the healthcare system. According to them, health

professionals told them that ZIKV posed a lower risk or no risk at all compared to other maternal infections, such as rubella and dengue:

> A - [...] People even said that Zika was weaker, compared to other diseases, Dengue, Chikungunya [...] (BR_PREGDURZIKA)

> A: [...] the mosquito that was only dengue was now coming with this whole bomb, and it was like that, quite confusing at the beginning, right, because we didn't have a .. how do you say... concrete information, right, because we started hearing a lot of things through social media, and then research began to come in, right, bringing what was actually happening. (BR_PREGDURZIKA)

Also because of this temporality, women's perceptions of the risks posed by ZIKV varied depending on the year in which their pregnancy occurred. Many women had their first contact with ZIKV through physical symptoms rather than through the media (Diniz, 2016, p. 61). In this time of uncertainty, other explanations for microcephaly cases have emerged, mostly online and from people in the community. In Brazil, interviewees reported false news stories linking microcephaly to vaccines and contaminated water.

> A – […] at that time there was a lot of fake news, saying that the problems that were happening with the fetuses were due to the rubella vaccine, if I'm not wrong, that was given to women, some things like that, and we heard a lot of things, a lot of unreliable sources [...] (BR_PREGDURZIKA).

> A - I heard that it was an arbovirus, that it was transmitted by the aedes aegypti and that it was a new epidemic, so there were few studies, this relation with microcephaly was still a suspicion, there was not, there was not... the amount of studies was still insufficient to make this connection, so there were many stories, there were cases, there were people who said it came from the water, the World Cup brought it, there were several stories, but when in doubt we prefer to protect ourselves [...] (BR_PREGDURZIKA).

In this way, the research shows that the period during which the person was pregnant appears to be a determining factor in terms of access to information (2015-2017). In Brazil, the first generation of women who were pregnant before CZS was known were surprised when they gave birth or were informed of the diagnosis late, which was not the case in Colombia and Puerto Rico.

> R - No, only after [name of the child] was told, because... because I did all the prenatal care, all the follow-up and had no complications, only after the child was born was that the suspicion came, right, microcephaly. (BR_PREGDURZIKA_CZS).

> A - Of Zika only after my daughter was born, when I became pregnant I was infected by this virus, they only told me it was chikungunya, they didn't know what could happen, I said, I informed that I was pregnant and then nobody knew how to inform me what

> could happen, and so, I had small bleedings, and went ahead with the pregnancy, I got it in the 12th week of pregnancy, so, as nobody knew anything about it, I had no way to know how the pregnancy would be, fetus, after, nothing, it was all a surprise to me, I only found out about Zika virus, after she was born, which was when they all started to be born in the Northeast with microcephaly, and when they started to do the exams, they saw that in fact it was microcephaly by Zika virus. [...] (BR_PREGDURZIKA_CZS).

Information provided by health professionals was considered the most reliable in all three countries because of the understanding that it was a new disease and because these professionals provided reassurance, comfort, and hope. It was also considered to be the most comprehensive information.

> A - The information that I found more reliable was the information that doctor [doctor's name] brought us at that moment right, that is the [doctor's name] I team, my obstetrician was doctor [obstetrician's name] right, and who did these our exams and who did our follow-up, but who really brought us information regarding possibilities, characteristics of symptoms experienced by children was more doctor [doctor's name] because when it affected, like this, my child had such a part of the brain more affected the doctor [name of the doctor] sat down with the neurologist and was well informed about what that was going to cause in the life of that child and she passed it on to us in a very soft way, that we brought us a comfort and a hope [...] (BR_PREGDURZIKA_CZS).

Meanwhile, the least reliable sources are acquaintances and neighbors in all contexts because they "make things up", just like the Internet.

> [...] we heard a lot of things, a lot of unreliable sources, right, so I didn't pay much attention to the internet, Facebook, that kind of thing, I didn't pay much attention, I trusted the information from my doctor. (BR_PREGDURZIKA)

Knowledge and feelings associated with ZIKV prevention

In several interviews, participants expressed that they were aware of the ZIKV outbreak but lacked information about the consequences of maternal ZIKV infection on child health. In all countries, women reported basic information about ZIKV, usually knowing that it is a virus transmitted by mosquitoes, like DENV or CHIKV, and that it has adverse effects during pregnancy. One woman in Brazil and two in Puerto Rico expressed the possibility that ZIKV could be sexually transmitted.

> A: It is a mosquito-borne disease similar to dengue and chikungunya. So, in the same way that we are at risk of those, that there are annual outbreaks, we were also exposed to Zika. That it had some symptoms... I think I remember... it was like a kind of flu or pain in the body, those were the symptoms. That it particularly affected pregnancies because it could generate some problems in the babies, in the development of the babies, specifically, I think, I don't remember if it was something in the brain that they said, like it was,

> the development of the head a little bit smaller. [...]. At one time there was a discussion if there was a sexual transmission issue in maybe a couple that had Zika that could have been transmitted through semen and things like that. I don't really remember if it was said that there was, but I think it was that it was passed on through sexual transmission. (PR_PREGDURZIKA).

The fear of being bitten by the mosquito and the possible consequences of ZIKV infection caused a lot of anxiety among women, who often talked about feeling pressured to seek preventive care. In some cases, having information was perceived , as depressing. In Brazil and Colombia, respondents reported being afraid to ask for more information.

> Well, in what I read on the internet it was seen that it was with microcephaly, that they were left with sequelae of paralysis, that sometimes they could not walk, could not speak, and had convulsions, yes, then this gave me depression and I did not read anything again, because it tried to give me depression to see everything that happened to me with my baby. (COL_PREGDURZIKA_CZS).

Among ZIKV prevention measures, the use of repellents during pregnancy was the most frequently reported. It was usually recommended by healthcare professionals, the media, close relatives, friends, or acquaintances. Women reported that, even in periods of very hot weather, they used light clothing that covered their whole body. In addition, a woman in Brazil reported the difficulty of using repellent because pregnant women cannot use any brand.

> I spent my entire pregnancy using a lot of repellent, then I walked here in Recife, which is very hot, I don't know if you know it here, but I wore a long shirt, long pants, closed sneakers, and used repellent on my hands, I walked around the city dying of heat, afraid [...] (BR_PREGDURZIKA).

Also in terms of preventive measures, women in Brazil report that they installed mosquito nets at home and socially isolated themselves. Finally, there are also reports of increased medical follow-up. Preventive measures are associated with feelings of fear and terror.

> I knew everything about mosquitoes, I knew everything I had to do, and I watched a lot of newspapers, so it was giving me panic, I wore long sleeve clothes, look, in the middle of January, I wore long sleeve clothes, all white, I wore all white clothes because I saw that the mosquitoes, in white clothes were better to repel them, [...] I bought mosquito netting, we closed all the gaps in our glass window, we bought citronella, we bought candles… when we saw what could happen, we closed ourselves up, [...] it was very terrifying, I remember he said you couldn't drink water from the same glass, you couldn't kiss [...] I need to relax my heart [...] I maintained the care but calmed down, but I continued

> watching the news, you know, my husband read it, he followed it to know if he did something, but I didn't follow it all the time, you know. (BR_PREGDURZIKA).

During the epidemic, women also cited the environment around them as a form of prevention and control. In general, these actions are associated with individual measures that prevent the proliferation of mosquitoes in their homes and neighborhood. Basic sanitation was mentioned by only one respondent in Brazil.

> R - No, they didn't give me any orientation. Where I lived there was a lady who had many plants. So, my backyard was closed, I didn't have plants, I didn't have anything, I didn't leave water standing there. But I don't know the backyard of the neighbor, right, you can tell from your house, but from the house of others you have no way to see. But I think it's because there were a lot of plants, there must have been pots with stored water, because there were a lot of mosquitoes in the house, we had to take medicine, or we couldn't sleep. We had to put poison before going to sleep. (BR_PREGDURZIKA).

Sources of Information of ZIKV during the Covid-19 pandemic

Non-pregnant women during the ZIKV epidemic and pregnant women during the Covid-19 pandemic had different experiences with women's sources of information, as reported in the previous chapter. In all countries, television and the Internet were the most commonly used sources of information. In addition, infected close contacts were also reported as sources of information about ZIKV. Thus, the most commonly used information sources were analyzed in terms of their reliability, the feelings associated with accessing the information, and the main actions taken in light of the information received.

Types, reliability, and feelings related to information access

In Brazil, two interviewees emphasized that when they searched for information on the Internet, they only accessed reliable media. For one respondent in Brazil, the Internet appeared to be a way to supplement incomplete information on television (discovered the possibility of sexual transmission of ZIKV). For another respondent in Puerto Rico, the Internet is beneficial because you can access information at any time.

> A -[...] I went searching on the internet because they said that Zika could be sexually transmitted, and that was something that I didn't know, I thought that the transmission was made by the mosquito, and then it was something that I went to check, because when I saw the information about this I could not find, it is like this, in the advertisements, in the things that were on TV, what people said in general I did not remember this information, I remember that this was something that I went searching on the internet. (BR_NOPREGDURZIKA).

> P: What about the news and the CDC? Well, the CDC to me is a reliable source. But you always look at the news to see where the outbreaks are, the cases that are coming to light, basically that. And well right now social media has also been, more like I'm telling you at the moment. Unlike the news that you have to, well you have to wait for a certain time to hear the news, on the internet you can read it at all times and be aware of it, just like Covid now. (PR_NOPREGDURZIKA).

On the other hand, the recently pregnant women reported that the most used sources of information about ZIKV in 2020 were healthcare professionals because ZIKV was not longer present in the mass media. Two women, from Brazil and Puerto Rico, expressed that some healthcare providers did not inform them about ZIKV, but only Covid-19. Their perception is that there is no risk for ZIKV, the preventive measures are just a protocol to follow.

> A: Well, I've never been told anything ((laughs)). Well, it is that as it is something that people have said that already.... it's not that it doesn't exist, it's that there is no longer an outbreak, and nothing has been mentioned. Well, you know they no longer give emphasis... but I imagine if you have questions your OBG should answer the questions. If you don't refer it to, at least in my hospital we have the CDC staff that if you go with symptoms whether you are pregnant or not with any, right, if you have a fever in itself and the CDC puts that little flag and goes and asks you goes and does the initial interview, takes the samples to then investigate if it has to do with Zika, chikungunya, dengue etc. So (then) I think that your OBG should give you all your information and if not refer it to someone else you know .(PR_NOPREGDURZIKA).

In Puerto Rico, women who were pregnant during the Covid-19 pandemic report that their knowledge about ZIKV was obtained during the epidemic (2015-17). Thus, one woman has the perception that she had to rely on herself to seek correct information and prevent a possible ZIKV infection in 2020.

> Q: [...] It is something unforeseen really when you spend your life, you have to educate yourself, look for information, how to prevent the disease. But what I know is that, if it affects pregnant women, I think because of a mosquito. That is the only thing I know (PR_NOPREGDURZIKA).

There are no reports of nervousness or anxiety associated with the way the information was transmitted during the ZIKV epidemic by this group, probably because during the period of the interviews, Covid-19 was affecting the general population with high mortality (especially in the pregnant women group). This probably led to the erasure of the consequences of the ZIKV, especially after the end of this health emergency.

Knowledge and feelings associated with ZIKV prevention

Some interviewees in Brazil expressed that microcephaly is a possible consequence of ZIKV infection. Currently pregnant women reported little information about ZIKV and no difference with information given years ago (use of repellents was the general recommendation about ZIKV in 2020). In Brazil, the need to wear long clothing is mentioned, and one respondent stated that she had received guidance to avoid mosquito bites during periods of heat and rain, but without linking this care to ZIKV.

> R - So, it was never a matter of explaining what it was. The only orientation that I received was that I needed to use repellent, because there was a risk for the baby, in the issue of pregnancy and especially at this time that it rains, then it is sunny, there was more risk of having an outbreak of zika and I needed to use repellent. And also, it was never something that I asked, right, "Ah, but what can it cause in the baby? "What I knew was something more external, right, and then I took care of it. (BR_NOPREGDURZIKA).

In Brazil and Puerto Rico, interviewees reported having received antibody testing. One respondent in Brazil reported that healthcare providers are not currently emphasizing the need for ZIKV prevention.

> No, no, because in truth, it was not much information, what she did was to check if I had already had it, to do an examination to see if I had antibodies and she gave me a recommendation to use repellant, to be careful, but I confess that it was something like this, as we are in this time of pandemic and I haven't left the house much, I ended up worrying less about this, I think I would worry if it was at another time, you know. [...] Actually I was not told many things, no... I remember that in my first prenatal consultation in one of the doctors I went, because I went to some, but one of the doctors I went to asked me if I had already had Zika, then I said no, and when she passed the blood tests she passed that test of antibodies, she passed to check for zika, chikungunya, dengue, for other diseases, and in fact she was the only one who in some moment touched this subject of asking if I had already had it, she passed this blood test to confirm if I had any antibodies, and recommended me to use repellent, generic things, right, but only. (BR_NOPREGDURZIKA).

Two interviewees from Brazil also mentioned environmental concerns and social inequality as ways to control arboviruses and, thus ZIKV infection. One respondent, however, stated that it was a matter of locality but not social class.

> People? No, no ... I didn't think about that, no, because as it is a ... transmitted by a mosquito, anyone could have it, it's just a matter of ... What I realize is that there are regions here in the city that have more mosquitoes than others, so I think they end up being more susceptible to have zika, but not a certain person or age group or social class, I don't think so, I don't think it has anything to do with it. (BR_NOPREGDURZIKA).

In the three countries, interviewees do not talk about worries or fear related to ZIKV prevention because the level of concern is not the same as during the epidemic.

Discussion

When the ZIKV epidemic emerged as a public health emergency, Brazil, Colombia, and Puerto Rico were experiencing political instability and austerity. In the first two countries, response strategies that required increased government investment, such as basic sanitation, were downplayed in favor of mosquito-bite prevention strategies targeting women of reproductive age. Meanwhile, Puerto Rico, as an unincorporated territory of the United States, had the distinction of receiving CDC funding for contraceptive access and other interventions during the ZIKV epidemic.

In the context of the Covid-19 pandemic, differences between countries became more apparent. Brazil was characterized by inadequate promotion of preventive measures (Machado; Pereira; Freitas, 2022). These factors, among others, ranked the country fourth in the number of deaths from Covid-19 per 100,000 inhabitants (Johns Hopkins, 2023). Nevertheless, the country's unified health system and technological centers contributed to the initiation of Covid-19 vaccination (UNA-SUS, 2021) and the inclusion of pregnant women in the priority group in July 2021 (Governo Federal, 2021). Meanwhile, the governments of Colombia and Puerto Rico implemented preventive measures for vulnerable populations. As a result, these countries did not experience the alarming number of preventable deaths, including maternal deaths, that Brazil experienced (Souza; Amorim, 2021).

The social, political, and economic context of the three countries has a direct impact on how health emergencies are handled. In terms of the sources of information used, scenarios of political instability can directly influence how information is constructed and disseminated, both in traditional media and in social networks and health systems.

In all three countries, television was the main source of information used by both groups of women to learn about ZIKV. However, interviewees reported that the information was general and not in-depth. The Internet was the second most cited source for both groups, but it was approached with greater distrust. In contrast, specifically during the Covid-19 pandemic, healthcare providers became the main source of information about ZIKV for pregnant women during this period. These

women reported that news about Covid-19 consumed media space, leaving them underinformed or uninformed about the risks of ZIKV, even though it is a recurring problem (Regla-Nava, *et al.*, 2022).

In Brazil, media coverage of the ZIKV epidemic was intense in 2015 and 2016 (Andrade; Lima, 2019). Whereas in Puerto Rico and Colombia, coverage was more intense in 2016 (Dirlikov *et al.*, 2016; Gamboa; Rodríguez-Lesmes, 2018), after the first diagnosis was made in November 2015, and after learning about the experiences of other countries. Research on media performance during these years shows that ZIKV was initially treated as a milder risk disease than DENV, a harmless arbovirus, that we should live with (Rodrigues, 2018). As of November 2015, news appeared that correlated ZIKV with cases of microcephaly in the northeast of Brazil, changing the perspective of the information to warn about the high risk of the virus and the great impact on the lives of pregnant women (Santos; Matias; Novais, 2018; Rodrigues, 2018). It is noteworthy that before the increase in microcephaly cases, the information about ZIKV normalized a new disease with still unknown consequences, which was reported by some interviewees, especially for those belonging to the first generation of infected women (Diniz, 2016, p. 57). The information that ZIKV was a risk-free disease was surprisingly spread by health professionals in Brazil.

Interviewees who were pregnant during the ZIKV epidemic expressed that the news focused on children born with microcephaly and, subsidiarily, on measures to protect against mosquito bites, in the same sense as previous research (Andrade; Lima, 2019; Noccioli, 2020, pp. 141-150; Silva, 2019, p. 67), while other possible solutions were not mentioned as much. Like the media, the Brazilian government used fear to raise awareness about the new disease, but without mechanisms to reduce the fear they caused (Löwy, 2019). Even when health education efforts included instructions on how to eliminate the vector, the context of scientific uncertainty, polemical statements, and the large number of microcephaly cases did not alleviate fear (Leonel; Oliveira-Costa, 2022). For example, many participants said that the media coverage was sensationalist, generalized, and contradictory, which made them anxious and nervous. Faced with this, some women simply stopped looking for information or only sought information from health professionals.

WhatsApp was mentioned by only two interviewees from the group of pregnant women during the ZIKV epidemic in Brazil. Similarly, few women mentioned women's groups (not mentioned in Colombia). Interviewees from Puerto Rico

highlighted government-sponsored emphasized the health education efforts as a source of information, focusing on preventive measures to avoid mosquito bites or sexual transmission during pregnancy. No such efforts were mentioned in the other two countries.

Some of the women interviewed in Brazil did not have access to preventive measures because they belong to the first generation of women infected with ZIKV (Diniz, 2016, p. 57), so they only discovered CZS in their children shortly before or after delivery. This period of uncertainty was conducive to alternative explanations, such as water contamination or the rubella vaccine as a cause of microcephaly. In this scenario, healthcare professionals were considered the most reliable source of information for pregnant women during the ZIKV epidemic, as they had the most complete information, which provided hope and comfort.

In terms of pregnant women's knowledge of ZIKV during the epidemic, interviewees made connections to their experiences with DENV and CHIKV. As such, it was perceived how information and knowledge is constructed by women and communities based on their experiences. According to interviewees, the use of repellents was the most recommended preventive measure across all sources of information, and there are also reports on the use of white and long clothes, mosquito screens and social isolation. However, the possibility of sexual transmission and the need for basic sanitation are rarely mentioned. It is noticeable that individual protective measures predominated as the main forms of protection against the virus. This shows how a collective experience - the ZIKV epidemic - was individualized, and the responsibility for their own care was given to the main victims (Diniz, 2016, p. 31), while collective and government actions were neglected. Not coincidentally, interviewees, regardless of whether their children had CZS or not, reported that their pregnancies were plagued by feelings of fear (including of being informed), terror, panic, and pressure related to the prevention of the disease.

The feelings of terror reported by interviewees, associated with access to information, show the need for a different approach for the media to better achieve their social goals, even in the face of uncertainty (Rodrigues; Grisotti, 2019). The mass media in all three countries rarely mentioned the living conditions and social determinants of health associated with the population's increased risk of ZIKV infection (Rodrigues, 2018; Romero *et al.*, 2022; Tepper *et al.*, 2016). In addition, gender was not considered as a communication strategy (Rivillas *et al.*, 2019) so

people of reproductive age were both the most affected and the most responsible for controlling the disease.

The possibility of sexual transmission of the virus was barely mentioned by both groups of women, which raises questions about their knowledge about sexual and reproductive rights (such as contraceptive methods and abortion). The legislation of Colombia and Puerto Rico made safe abortion possible during the epidemic, unlike Brazil (with the growth of conservative forces during that period). In this country, information favorable to sexual and reproductive rights (especially abortion) gained space in the media, but discourses centered on the defense of life were still present (Castilhos; Almeida, 2020). Brazilian parliamentary forces, though able debate and change this scenario, openly rejected the issue (Wenhama, *et al.*, 2021).

In Puerto Rico, access to contraceptives was only improved during the pandemic with the support of Centers for Disease Control and Prevention (CDC) resources and some local professionals (Romero *et al.*, 2022). In Colombia, a study reported the stigmatization and social criminalization of abortion even during the ZIKV epidemic (Marbán-Castro *et al.*, 2022). In different contexts, interviewees' reports confirm how efforts in the three countries were focused on preventing the vector, with little or no attention to sexual and reproductive rights, which were not included in the response to the ZIKV outbreak (Wenhama *et al.*, 2021).

Even after the discovery of CZS, further uncertainties remain about the distribution of epidemiologic risk and the provision of a stable and equitable pattern of supportive care for those most affected by the outbreak (Kellya *et al.*, 2020). For this reason, it is important to reinforce that the news media should provide relevant news on epidemic-related topics at all times and not only during specific periods or health crises (Rosa; Machado, 2017). As observed, this recommendation was not followed as interviewees reported a lack of information in the media about ZIKV in 2020.

Interviewees who were pregnant during the Covid-19 pandemic show that they have the knowledge about ZIKV obtained in 2015-2016. The preventive measures cited by these women are basically the same: repellent and long clothing. Only two interviewees, from Brazil and Puerto Rico, mentioned testing to know if they had antibodies against the virus. The lack of information (caused by the lack of media coverage and the fact that main sources of information about ZIKV were health professionals) seems to lead to a false perception of reality, such as the belief that there are no risks, that preventive measures are mere protocols, and that microcephaly is

not that worrisome. Thus, respondents do not report feelings of anxiety or terror associated with the preventive measures they take.

The fact that the group of pregnant women during the Covid-19 pandemic did not report anxiety or nervousness about ZIKV may be related to the current focus on the Covid-19 pandemic. This shows how feelings of nervousness and anxiety were shared by both groups at different times and in different contexts, due to the uncertainties that a public health emergency can create in the lives of pregnant individuals.

Health education efforts could enable pregnant women to access information about ZIKV during the Covid-19 pandemic in a way that is not concentrated on a specific period and group. Permanent information sharing could help consolidate social knowledge about the epidemic, rather than placing the responsibility solely on the most vulnerable group.

Finally, this study had some limitations. Cognitive biases may have affected the interviews, where participants were asked about their pregnancies that occurred during the ZIKV epidemic (years earlier). Also, the periods of the ZIKV epidemic and the Covid-19 pandemic were too different to draw conclusions for all participants or to compare responses.

Conclusions

Pregnant women in Brazil, Colombia, and Puerto Rico had varying levels of knowledge about ZIKV and other infectious diseases transmitted during pregnancy. Sources of information were rated differently by participants, but a common perception was that messages received through the mass media were alarmist. Interviews conducted during the Covid-19 pandemic revealed low awareness about ZIKV, years after the epidemic. This study highlights the needs of these populations, and the importance of including health education processes and strengthening public health communication strategies, as well as specific continuous education processes for health professionals on sensitive approaches to communicating results to pregnant women and providing psychosocial support.[2]

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Notes

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Resumo

Percepções das mulheres grávidas sobre as fontes de informação relativas ao vírus Zika: um estudo qualitativo

A epidemia do vírus Zika (ZIKV) teve impacto sanitário, psicossocial e econômico sobre pessoas em idade reprodutiva. A principal preocupação foi a infecção durante a gravidez devido a possível transmissão vertical e sua associação com resultados fetais e infantis adversos, conhecida como síndrome congênita associada à infecção pelo Vírus Zika (SCZ). Este estudo qualitativo utiliza a fenomenologia e a teoria fundamentada. O estudo inclui entrevistas com 98 mulheres, parte grávida durante a epidemia de ZIKV no Brasil, Colômbia e Porto Rico e que tiveram filhos com SCZ ou sem comprometimento neurológico diagnosticado. Além disso, o estudo inclui um grupo de mulheres grávidas durante a pandemia de Covid-19 nos mesmos países. Em ambos os grupos, as entrevistadas tinham diferentes níveis de conhecimento sobre ZIKV. O estudo constatou que as mensagens veiculadas por meio da mídia eram alarmistas; em contraste com as informações fornecidas por profissionais de saúde, consideradas mais confiáveis. Mulheres gestantes durante a epidemia do ZIKV relataram ter recebido seu diagnóstico de infecção por ZIKV e SCZ tardiamente ou após o parto. O estudo destaca as necessidades das mulheres grávidas em cenários de alto risco, a importância de processos de educação em saúde e a necessidade de reforçar a comunicação e a educação continuada.

➤ **Palavras-chave:** Vírus Zika. Fontes de Informação. Mulheres grávidas. Microcefalia. Covid-19.