Vaccine 39 (2021) 4700–4704

Contents lists available at ScienceDirect

Vaccine

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

"*From my phone, I could rule the world*": Critical engagement with maternal vaccine information, vaccine confidence builders and post-Zika outbreak rumours in Brazil

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ARTICLE INFO

Article history:
Received 15 February 2021
Received in revised form 9 June 2021
Accepted 14 June 2021
Available online 3 July 2021

Keywords:
Maternal immunization
Vaccine confidence
Rumours
Post-outbreak
Microcephaly
Zika
Maternal Health
Qualitative Research

ABSTRACT

Maternal immunization is key to protecting maternal and newborn health. We interviewed pregnant women in Brazil to identify barriers to and enablers of maternal immunization in the country. In-depth interviews and focus groups were conducted in Brazil with 60 pregnant women from São Paulo and Rio de Janeiro at different stages of their pregnancies. Participants were encouraged to discuss views on safety, efficacy and importance of maternal vaccines, access to vaccines, interactions with healthcare professionals, and sources of information on vaccine-related matters. There was generally a positive regard for maternal immunization among the interviewed women, many of whom associated vaccination with protection of their unborn child. The interviewees cited several reasons for adherence to immunization guidelines, including recommendations from healthcare professionals, targeted communication campaigns, and active use of a vaccination card or booklet. There were no reported barriers for maternal vaccines. Some women using private healthcare services reported not having been asked about vaccines at check-ups, which could adversely affect vaccination rates. A rumour that vaccines caused microcephaly which emerged during the Zika outbreak was the most commonly cited reason for choosing not to vaccinate among the interviewees. This study identified important vaccine confidence builders. Many of the interviewees critically reflected upon information received, placing themselves as the decision makers over their health choices. A prominent barrier to maternal immunization was a rumour linking vaccines to microcephaly. To the best of our knowledge, this has not been previously reported in the literature and requires further investigation into the extent of this issue and how it can be mitigated.

1. Introduction

The reduction of maternal and newborn mortality is a global health priority [1]. Maternal immunization programmes have been highly effective at preventing illness in women and newborns [2]. Preventable diseases including influenza, tetanus and pertussis, can be controlled with adequate maternal vaccination coverage [3].

Brazil's national immunization programme (*Programa Nacional de Imunizações*) was created in 1973 on the heels of an effective smallpox eradication campaign [4] and at a time of intense health sector reform, which came to be known as the Brazilian sanitation movement (*movimento sanitarista brasileiro*). This reform, driven by civil societies, led to the introduction of the national Unified Health System (*Sistema Único de Saúde;* SUS), established in the 1988 constitution. Despite the expansion of universal health care in Brazil, a dual public–private system still exists which has perpetuated inequities in both access and outcomes. SUS is publicly funded through government and the latter is accessed primarily by high-income patients, with care paid for either out of pocket or by private health insurers [5].

Under SUS, the national government has worked to improve the availability and affordability of medicines, including vaccines. The national immunization programme was expanded gradually and currently accounts for 95% of all vaccines given to the population, including privately-insured patients [5]. All vaccines are given to individuals free at the point of use [6].

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https://doi.org/10.1016/j.vaccine.2021.06.039
0264-410X/

Currently, the following vaccines are recommended during pregnancy in Brazil: hepatitis B, dT (diphtheria and tetanus), Tdap (diphtheria, tetanus and whooping cough) and influenza (in campaigns) [7]. The yellow fever vaccination is only recommended for pregnant women living in regions with a high risk of exposure [8]. Maternal immunization has decreased mortality and morbidity among women in Brazil [9]. Yet coverage of different vaccines vary widely: in 2020, uptake of the flu vaccine among pregnant women was 63%, compared to 43% for Tdap and 22% for dT [10].

In addition to diseases that pregnant women were already vulnerable to, Brazil was hit by Zika virus in 2013, which circulated unnoticed for months [11]. When contracted during pregnancy, Zika can cause permanent neurological dysfunction in the foetus [12]. The outbreak became an international emergency in 2015, mostly affecting pregnant women and leaving behind thousands of newborns with microcephaly [13] and other impairments associated with congenital Zika syndrome [14].

1.1. Vaccine confidence: Barriers and predictors of maternal vaccine acceptance

Vaccine confidence is context specific, and is a spectrum that goes from complete acceptance to complete refusal of vaccination [15]. It is influenced by factors such as complacency (when risk perception is low), convenience (when access is difficult) and confidence (trust in vaccine, providers and systems offering vaccination) [16].

There is a growing body of literature about the barriers and predictors of maternal immunization globally. Barriers to maternal vaccination include safety concerns [17,18]; issues in access to vaccination [19]; and rumours [20]. Predictors of maternal immunization include recommendation by a healthcare professional (HCP) [18] and support of family and partner towards maternal vaccination [21]. Yet, attitudes around maternal immunization in Brazil remain understudied.

2. Methods

2.1. Study site

The research was conducted in two main urban centres in Brazil: São Paulo and Rio de Janeiro. The two cities were selected for several reasons. First, they are located in two states with different demographic characteristics and health system configurations. Second, both cities have high urban demographic concentration which can facilitate virus contagion. Third, they have active outbreaks of measles and are endemic to other infectious diseases including dengue, chikungunya and Zika. This article adheres to the Standards for Reporting Qualitative Research (SRQR) reporting guideline [22] (Appendix 1).

2.2. Recruitment

We collaborated with WIN-Gallup International Association (WIN/GIA), a well-established global research firm, to recruit pregnant women and conduct interviews and focus groups in Brazil. In total, 60 pregnant women from São Paulo (n = 30) and Rio de Janeiro (n = 30) participated in this study. One screening question assessing willingness to take vaccines recommended by HCPs was used to purposively sample women with both positive and negative attitudes towards maternal immunization. WIN/GIA collaborated with their subsidiaries in Brazil to obtain access to a panel of participants from which pregnant women were selected. In addition, both in Rio and São Paulo a trained recruiter was sent to hospitals, healthcare centres that provide antenatal care, private clinics and maternity hospitals to purposively recruit additional participants. No chain or snowballing recruitment methodology was needed.

2.3. Data collection

Original data was collected by WIN/GIA, who conducted in-depth interviews and focus groups, in Portuguese. Data collectors were experienced professionals briefed on the overall objectives of study. Data collection took place between February and April 2019 in the two cities. Two topic guides were developed, one for in-depth interviews and another for focus groups. They were written in a way to encourage participants to discuss their views and opinions freely. Audio files of focus groups and interviews were translated and transcribed directly into English. Translation from Portuguese to English was conducted by a professional translator at WIN/GIA. To ensure the fidelity of the translation, C.S. (a native Portuguese speaker) compared the English transcripts to audio recordings for accuracy.

2.4. In-depth interviews

Twenty in-depth interviews were conducted with pregnant women, either face-to-face or over the phone. Due to mobility limitations from advanced pregnancy, the option of participating over the phone was given to participants. In instances when a face-to-face interview was possible, data collection took place at the research offices of WIN/GIA subsidiaries in São Paulo and Rio de Janeiro. These offices are not a medical setting and did not represent any hospital or health centre. The majority of interviews were conducted in person. Participants were compensated for travel, subsistence and participation in the research.

2.5. Focus groups

Four focus groups were conducted (two per location). Each group was composed of 10 women of different ages and stages of pregnancy. Groups were split into first time pregnancies and second or higher pregnancy. All focus groups required participants to attend in person and were conducted at the country offices of WIN/GIA. Participants were compensated for travel, subsistence and participation in the research.

2.6. Data management and analyses

To ensure confidentiality, all data were anonymized. Confidentiality was maintained by using solely the codes assigned (RJ for Rio de Janeiro and SP to São Paulo) and we ensured participants cannot be identified through contextual information. Data were stored anonymously within a secure server on password protected computers. Only co-investigators cited in the ethics approval have access to the files.

Transcripts were analysed using NVivo 11 software (QSR International, Melbourne, Australia), to develop a grounded theory of the views and decision-making towards maternal immunization in Brazil. The data were organised and coded under themes which emerged when pregnant women were surveyed about different aspects of maternal immunization.

2.7. Ethical approval

We received approval to conduct secondary data analysis from the London School of Hygiene & Tropical Medicine ethics committee in May 2019 (LSHTM ethics ref: 17100). For primary data collection, standard industry verbal and written consent was obtained by WIN/Gallup International Association (WIN/GIA).

Participants were informed their participation was voluntary and they were allowed to refuse to answer any question or end the interview at any time. All participants provided authorization of the use of data for research purposes only, regardless of research institution.

3. Findings

The ages of the women participating in this study ranged from 18 to 37 years old, with an average age of 27.3. Fifty percent (50%, n = 31) of participants were first time mothers. Approximately one third (32%, n = 19) of recruited women were pre-identified as having negative attitudes towards vaccines. The findings of this study have been categorized into six themes: experience accessing maternal vaccination in Brazil; maternal immunization as moral responsibility and strategy of care for children; system confidence builders; pregnant women as the main decision makers; critical engagement with maternal vaccine information online; and perceptions of vaccine safety and post-Zika outbreak rumours

3.1. Experience accessing maternal vaccination in Brazil

Most participants reported good access to maternal immunization and did not report any impediments (e.g. distance to clinic, financial impediment). Poor access was reported only for the non-universally recommended yellow fever vaccination.

Participants reported a mixed use of private and public care services and vaccines were usually received in public services: "I'm doing all pre-natal privately, but I vaccinate in the public system" (RJ). The ease of access of maternal immunization within the public system shows in this mother's preference for vaccinating at a public hospital: "At the moment the (public) health system is providing vaccines so well that even if it would be easier (to vaccinate at a private clinic), I wouldn't do it" (RJ).

3.2. Maternal immunization as moral responsibility and strategy of care for children

Pregnant women discussed taking proactive responsibility for maternal immunization. A number of participants reported more awareness of vaccination during pregnancy: "If I wasn't pregnant I wouldn't take all these vaccines" (SP). The perception of vaccination as more important during pregnancy was associated with being a good mother. There was a strong association between maternal vaccination and a strategy of care to protect their children. "We're carrying a life inside of us, so we must protect it" (RJ). There is also a view of maternal vaccination as a moral responsibility: "I took all the vaccines, it is my responsibility (...) for the baby" (SP).

Interestingly, participants mentioned caring for their children not only to justify accepting vaccination, but also when refusing. Here, both vaccination and non-vaccination can be seen as strategies of care – refusing vaccination can be seen as protection when the mother believes the vaccine could harm their child.

3.3. System confidence builders

Most participants mentioned three main factors as pivotal to their decision to vaccinate: the vaccination card, government communication campaigns targeting pregnant women, and recommendation by their HCPs.

3.4. Vaccination card/booklet

The vaccination card or booklet (*Cartão de vacinação*, in Portuguese) is used by both pregnant women and HCPs as a reference for information, and to have a record of which vaccines have been taken. Most participants mentioned HCPs (mostly those from the public system) asked for their vaccination card: "(The vaccination booklet) was one of the first things my doctor checked" (RJ). Pregnant women held HCPs accountable when their cards were not checked: "The doctor should have asked for my vaccination card in the first place to check which vaccines I had taken" (SP). Relying on the vaccination card lessens the importance of previous knowledge about recommended vaccines.

The vaccination card is regarded with the same importance as other official documents, e.g. a national identity (ID) card. This perceived importance is likely related to the many card checks. These occur at different stages in their interactions with the public healthcare system, including delivery: "When you go into labour, they check your vaccination card first" (SP). At times, the information on the vaccination card trumped HCPs orientation: "Even if it is a doctor recommending a vaccine not indicated in the vaccination booklet, I wouldn't take it" (RJ).

3.5. Government immunization communication campaigns

Communication campaigns targeting pregnant women were cited by many as a valuable and reliable source of information and often cited as a reason to vaccinate. "If it is in the vaccine (communication) campaign, I'll take it" (RJ). "In Brazil there are all kinds of diseases, so if you see a campaign you don't think twice. You just vaccinate" (RJ).

3.6. HCP recommendation and hierarchies of knowledge

HCPs are seen as a trustworthy source and their recommendation is a strong factor for acceptance among participants. The main reason for trusting HCPs was their expertise. To participants, HCPs have undergone intense formal education and are best equipped to provide information: "HCPs are the only ones prepared to answer questions (about vaccines). They have the knowledge, they studied for that" (RJ).

3.7. Pregnant women as the main decision-makers

Pregnant women in this study identified themselves as the main decision-makers in their overall health choices, including vaccination. One participant emphatically replied, when asked whose influence was the greatest in her decision: "I rely more on me!" (RJ).

While placing themselves as the main decision-makers, most participants welcome conversations about their health with family: "I take the decisions myself (...) but I do ask my mother" (SP). Another participant stressed her pivotal role in decision-making in relation to her husband: "I stick to what's on my mind. I talk to him (husband) but if I don't like his answer, I do what I want" (RJ).

3.8. "From my phone, I could rule the world": Critical engagement with maternal vaccine information online

Pregnant women widely reported searching online for information (including vaccination) and felt this was an important part of their decision-making process, a part that allowed them more control over their own health. One mother reported on a feeling of empowerment and self-ownership through digital technologies: "From my phone, I could rule the world!" (SP).

Participants revealed strong critical thinking when judging what they read online. Information is not passively absorbed but considered with reflexivity: "I look online but I am really careful with the answers" (SP). Most participants discussed concerns about veracity: "There is the fake news problem, many things online are not true (...). Unfortunately, the same way the internet can help with information, it might bring lies and problems" (RJ).

3.9. Perceptions of vaccine safety and post-Zika outbreak rumours

Most participants felt safer vaccinating: "(I vaccinate) to feel safe (...); I'll be protected and also my child" (RJ). Safety concerns mostly related to milder reactions (fever, local pain) and most participants preferred to risk vaccinating rather than be left unprotected.

However, among vaccine-refusing women surveyed, safety was the main reason not to vaccinate: "I fear my baby will have microcephaly because of the vaccine" (RJ). This reflects the reality of being pregnant after an outbreak that largely affected expecting mothers.

Following probing, women discussed the association between Zika and microcephaly as a cover up: "I remember pregnant women vaccinating following a campaign and after that, there were many cases of microcephaly. (...) People said it came from a mosquito, but this is to cover their mistake" (RJ). Participants reported suspicions over government initiatives: "We are losing trust in our government. We saw many cases of babies born with deformities, and people say it was because of the vaccine. We don't know if it's true, but we are scared. I think this government isn't good, and our level of suspicion is increasing because vaccines were always safe" (SP).

4. Discussion

Many important elements surrounding confidence in maternal immunization in Brazil were identified in this study. Participants generally reported good access to vaccinations and ease of access through the public system contributed to participants' overall positive. Many participants reported barriers to yellow fever vaccination in public health centres, likely due to lack of universal recommendation for pregnant women.

Participants were not complacent, holding a strong view that maternal immunization is an important strategy of care. Pregnant women reported it is their responsibility, as good mothers, to protect their babies. The fact that diseases which they vaccinate against are no longer common does not make women complacent – differently from other settings where absence of disease is cited as reason not to vaccinate during pregnancy [23].

There are important system confidence builders (e.g. HCP recommendation, government campaigns). This study particularly identified the positive regard participants have for their vaccination card and the many card checkpoints within the health system and beyond. Among participants, HCP recommendation is a strong factor for maternal vaccine acceptance. This is in agreement with overall literature on maternal immunization that places HCP recommendation as one of the leading factors for uptake [18].

Self-identifying as a critical thinker has been as a reason for mothers not to trust HCPs or disregard scientific information [24]. In this study, however, their critical assessment of maternal immunization starts with trust in HCPs while using multiple sources to inform their decision. As information-seeking behaviour can be heightened among pregnant women [25], in addition to consulting their HCPs, many participants gathered information from family and internet searches, and ultimately trusted themselves to make an informed decision. In particular, the use of smartphones and the internet to obtain information was perceived as empowering and important step in their decision-making.

Women who used private healthcare services were not asked about vaccines as consistently. This study suggests HCPs from the public system are stricter about follow up with vaccinations. Considering the mixed use of private and public systems in Brazil, this calls for attention as it could affect maternal immunization coverage.

The suspicion that vaccines can cause microcephaly is acknowledged as a possible barrier for confidence in maternal immunization. To the best of our knowledge, this is not yet documented in the literature. A common rumour during the Zika outbreak incorrectly associated microcephaly to vaccines [26]. The full impact of the Zika outbreak on trust in the healthcare system, HCPs, and vaccination remains unclear and more investigation is needed. While rumours can generally be seen as a result of misinformation [27], authors have emphasized the social significance of rumours, which can stem from deep mistrust of actors, government and institutions [28]. Rumours, then, are not simple misunderstandings but can convey more generalized concerns about medical interventions. Consequently, rumours can be more effectively addressed through active dialogue rather than correcting misinformation [29]

More research is needed to understand reasons for low uptake of some maternal vaccines in Brazil. There are many potential contributors, including vaccine hesitancy, supply issues, budgetary pressures and broader access issues [30]. Given the reported concerns and rumours over safety of vaccines found in this study, future research could examine how this uneasiness might be impacting decision-making. It is also possible that there are pockets of vaccine hesitancy in other parts of Brazil (outside Rio de Janeiro and São Paulo), which could help explain low uptake of certain immunizations. It is important to investigate regional differences in attitudes towards maternal vaccines, as well as attitudes towards specific vaccines (i.e. influenza vaccine, DTap).

4.1. Limitations

This study has limitations. As a qualitative study, findings capture experiences not easily assessed in quantitative investigations. Yet results may not be transferable to other regions. Second, both cities are two of the richest in the country. Therefore, access to vaccines is not necessarily the same as in other regions that do not have the same financial capacity. Lastly, some participants were recruited in health facilities and hence prone to use basic health services such as immunization, which might have produced such findings.

5. Conclusion

Maternal health has long been a public health priority in Brazil, with optimal maternal immunization a core component. This study attempted to assess views and attitudes of pregnant women and understand relevant factors in their decision-making process. The findings encompass system components to ways in which pregnant women reflect upon information received from different sources, including HCPs and internet searches. A possible barrier to maternal immunization identified was a rumour that blamed vaccines for microcephaly cases, which requires further investigation.

Declaration of Competing Interest

C.S., P.P. and H.J.L. are involved in collaborative grants with GlaxoSmithKline, Merck and Johnson & Johnson. H.J.L. has also received other support for participating in Merck meetings and

GlaxoSmithKline advisory roundtables; H.J.L. is a member of the Merck Vaccine Confidence Advisory Board. The views expressed are those of authors and not necessarily those of NIHR-HPRU or Public Health England.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.vaccine.2021.06.039.

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