ree

ORIGINAL ARTICLE

Influenza vaccination coverage in pregnant women in the Southeast region of Brazil: analysis from 2010 to 2020

Cobertura vacinal contra influenza em gestantes da região Sudeste do Brasil: análise de 2010–2020

Leyla Gabriela Verner Amaral Brandão[1], Thales Philipe Rodrigues da Silva[1], Josianne Dias Gusmão[2], Maria Clara Novaes Sousa[1], Layla Pinheiro Caires[1], Tércia Moreira Ribeiro da Silva[1], Fernanda Penido Matozinhos[1]

ABSTRACT

Objective: To analyze the influenza vaccination coverage in pregnant women in the Southeast region of Brazil between years 2010 and 2020. **Methods:** An ecological, time series study conducted with data from the National Immunization Program Information System (SI-PNI) referring to records of doses of influenza vaccine in pregnant women in the state of Minas Gerais. **Results:** Adequate vaccination coverage was achieved in only four out of the 11 years studied, ranging from 49.75% in 2011 to 88.5% in 2015. In 2020, the rate of 80.82% was reached. Possible determinants are discussed in an expanded perspective that can support the planning of actions across the country. **Conclusion:** Influenza vaccination coverage in pregnant women showed a stagnation trend for the most part, pointing to the possible need for continuing education of health professionals involved in antenatal care and qualification of their actions in the area of health education to clarify pregnant women's doubts on the subject.

Descriptors: Pregnant Women; Influenza Vaccines; Vaccination Coverage; Influenza, Human; Immunization Programs.

RESUMO

Objetivo: Analisar a cobertura vacinal contra a influenza em gestantes na região Sudeste do Brasil, nos anos de 2010 a 2020. **Métodos:** Estudo ecológico, de série temporal, realizado com dados do Sistema de Informação do Programa Nacional de Imunizações (SI-PNI), referentes aos registros de doses da vacina contra influenza em gestantes no estado de Minas Gerais. **Resultados:** A cobertura vacinal adequada foi alcançada em apenas quatro dos 11 anos estudados, variando de 49,75% em 2011 a 88,5% em 2015. No ano de 2020 foi alcançado 80,82%. Possíveis determinantes são discutidos em uma perspectiva ampliada, que pode subsidiar planejamento de ações em todo o país. **Conclusão:** A cobertura vacinal contra Influenza nas gestantes apresentou, em sua maior parte, uma tendência estacionária, apontando para a possível necessidade de educação permanente dos profissionais de saúde envolvidos no pré-natal, qualificação de suas ações na área de educação em saúde para esclarecer dúvidas das gestantes sobre a temática.

Descritores: Gestantes; Vacinas contra Influenza; Cobertura Vacinal; Influenza Humana; Programas de Imunização.

[1]Universidade Federal de Minas Gerais (UFMG) – Belo Horizonte (MG), Brazil. E-mails: leylagabrielawa@hotmail.com, thalesphilipe27@hotmail.com, claranovaesousa25@gmail.com, layla95caires@gmail.com, tercialud@gmail.com, nandapenido@hotmail.com

[2]Secretaria de Estado de Saúde de Minas Gerais (SSMG) – Belo Horizonte (MG), Brazil. E-mail: josiannedgusmao@yahoo.com.br

Financial support: Center for Studies and Research in Vaccination (NUPESV) and the Municipal Health Department of Minas Gerais (SES/MG).

How to cite this article: Brandão LGVA, Silva TPR, Gusmão JD, Sousa MCN, Caires LP, Silva TMR, et al. Influenza vaccination coverage in pregnant women in the Southeast region of Brazil: analysis from 2010 to 2020. Rev. Eletr. Enferm. [Internet]. 2022 [cited on: _____];24:70736. Available from: https://doi.org/10.5216/ree.v24.703736

Received on: 11/17/2021. **Accepted on:** 08/17/2022. **Available on:** 12/19/2022.

INTRODUCTION

Influenza is an acute respiratory disease caused by influenza A, B and C viruses, and types A and B are of most concern. Type A is characterized by its high virulence, causing serious respiratory disease or death, can foment a new flu epidemic and even a pandemic. Influenza B virus can also cause the seasonal flu epidemic[1].

This disease occurs in seasonal periods, especially from May to June in the southern hemisphere[2]. The number of cases increases this period, as the main form of transmission is from person to person through respiratory droplets produced by coughing, sneezing or talking, from an infected person to another susceptible person. Aerosol transmission can also occur, in addition to propagation through direct or indirect contact with respiratory secretions, when touching surfaces contaminated with the influenza virus and then touching eyes, the nose or mouth[3].

In this context, pregnant women are at risk for developing severe or fatal symptoms related to influenza virus infection, because the major physiological changes (immunological, metabolic, endocrine and vascular) during the gestational period[4] increase the chance of outcomes such as deaths[4].

The World Health Organization (WHO) recommends the influenza vaccination for all pregnant women at any gestational age. In this context, a Global Action Plan for Influenza Vaccines was launched in 2006 as a comprehensive 10-year strategy to reduce unequal access to the immunizer. One of its strategies is to make immunizations available to 70% of the world population[5]. In 2019, the WHO also launched a new global influenza control strategy. The plan covers the 2019-2030 period and is aimed at preventing seasonal influenza, controlling the spread of influenza from animals to humans, and preparing governments and societies for the next pandemic of this type of infection[5]. Influenza vaccination in pregnant women has shown to be highly effective. A case-control study demonstrated the effectiveness of 91.5% (95%CI 61.7–98.1) of vaccination of pregnant women to prevent hospitalization for influenza in infants in the first six months of life, which reinforces its indication for the protection of the mother-child binomial[6].

In this context, the Surveillance of Adverse Events performed after vaccination in the United States indicates an association between immunization and a 4,070.00% reduction in premature births and stillbirths resulting from influenza infection, and no association between influenza vaccination and complications during pregnancy, such as preeclampsia and cesarean section[7].

In 2010, the National Immunization Program included the influenza vaccine in the immunization schedule of pregnant women, established 80% as a vaccination target for each priority group by 2016 and expanded the target to 90% from 2017 onwards[8]. However, in 2019, the influenza vaccination coverage rate in pregnant women was 84.2% in the country[3].

A study that evaluated the vaccination coverage rate in Brazil found a stagnation trend in most states and an increasing number of vaccine abandonment in some Brazilian states, such as Minas Gerais[8]. In states with a high number of cities, the distribution of immunization among municipalities may not occur homogeneously, due to social, economic and cultural factors, and this may lead to an increase in the illness of the more vulnerable population[9].

Maintaining a high percentage of influenza immunization in pregnant women is essential, since the negative consequences of non-vaccination are well established in the literature[9]. It is essential that professionals of the multidisciplinary team know the vaccination situation in their area of coverage, understand the disparities found in this indicator and know the limitations that prevent the reach of established goals.

International research on influenza vaccination coverage in pregnant women[10-12] explains some factors that can lead to non-vaccination of the group in question, such as the territorial extension of a state[10]. In Brazil, authors also elucidate the vaccination coverage of all vaccines available in the Brazilian National Health System (SUS) and analyze the vaccination coverage in Brazilian states[8]. More specifically, they evaluate the vaccination coverage of different immunizers in Minas Gerais[9], although they have not specifically addressed influenza vaccination in pregnant women yet.

Given the above, the aim of this study is to analyze the influenza vaccination coverage in pregnant women in the state of Minas Gerais from 2010 to 2020.

METHODS

This is an ecological, time series study conducted with data from the Information System of the National Immunization Program (SI-PNI), referring to records of doses of influenza vaccine in pregnant women from 2010 to 2020 in the state of Minas Gerais, Brazil. The year 2021 was excluded because data were still unavailable on the website of the Information Technology Department of the Brazilian Unified Health System – DATASUS <http://sipni.datasus.gov.br/si-pni-web/faces/inicio.jsf>.

Minas Gerais has 853 municipalities spread over a territory of 586,522,122 km^2 and a population of 21,168,791 inhabitants in 2019. The state is divided into 19 Regional Health Superintendencies and nine Regional Health Managements, which were designed to guarantee the health management in all regions of the state and the quality of life of the population. Its competencies include: to implement the state health policies, advise the organization of services, coordinate, evaluate and monitor the health actions, among other functions, in accordance with Decree No. 47.769, of November 29, 2019, which provides for the organization of the Minas Gerais State Health Department[13].

Information on doses per year was collected through secondary data available on the DATASUS website <http://sipni.datasus.gov.br/si-pni-web/faces/inicio.jsf>. In this study, coverage of the influenza vaccine administered to pregnant women in the state of Minas Gerais by year was analyzed, considering Regional Health Superintendencies and Regional Health Managements.

Estimates of influenza vaccine coverage in pregnant women were calculated with the number of doses administered to pregnant women as the numerator and the number of pregnant women in the state during the study period as the denominator, and by Regional Health Management and Regional Health Superintendency multiplied by 100. Estimates of the number of pregnant women were prepared by the Brazilian Ministry of Health. The Statistical Software for Professional (Stata), StataCorp LLC®, the United States of American (USA), version 14.0 was used in data analysis. The interpretation of vaccination coverage rate was based on the goal established by the Brazilian Ministry of Health, considering as satisfactory ≥80% coverage for years 2010–2016 and ≥90% from 2017 onwards[8].

The Prais-Winsten autoregressive model was used for the time series trend regression analysis, having as dependent variables the vaccination coverage both by year and by Regional Health Management and Regional Health Superintendency, and the independent variables of years of the study (2010 to 2020). The results of this analysis were interpreted as follows: increasing trend when the *p-value* was less than 0.05 and a positive regression coefficient; decreasing trend when the p-value was less than 0.05 and negative regression coefficient; or stagnation trend when the p-value was greater than 0.05. The vaccine coverage both by year and by Regional Health Management and Regional Health Superintendency was transformed into the logarithmic scale to perform the Prais-Winsten regression. This process aims to reduce the heterogeneity of variance of residuals from the regression analysis[14].

The average Annual Percent Change (APC) was also calculated for each dependent variable analyzed. The following formula was used in the calculation: APC=(-1+10[b1]*100%), where b1 refers to the slope of the Prais-Winsten regression[15].

The 95% confidence intervals (95%CI) of the APC measurements were also calculated using the following formula: Minimum 95%CI=(-1+10[b1-t*e]*100%); and maximum 95%CI=(-1+10 [b1+t*e]*100%), in which values of the b1 coefficient and (standard error) were generated by the statistical analysis program; t refers to Student's *t*-test and corresponds to 10 degrees of freedom (2.228), which refers to 11 years of analysis, with a confidence level of 95%. For the entire analytical procedure, a significance level equal to or less than 5% was adopted[16].

Choropleth maps were used to visualize the spatial distribution of influenza vaccine coverage in pregnant women in the state by year, by Regional Health Superintendency and by Regional Health Management. The Quantum Geographic Information System (QGIS) program, Switzerland, version 2.18.14 was used in this analytical procedure.

The study regarding "Vaccination of pregnant women: evaluation of epidemiological and clinical aspects in the city of Belo Horizonte" was approved by the Research Ethics Committee of the Universidade Federal de Minas Gerais, under protocol number CAAE 53843716.0.0000.5149.

RESULTS

Table 1 shows the influenza vaccination coverage in pregnant women in the state of Minas Gerais during the study

Table 1. Vaccination coverage of influenza immunization and number of doses administered in the population of pregnant women, Minas Gerais, Brazil 2010 to 2020

Year	Number of pregnant women	Number of doses of influenza administered to pregnant women	Influenza vaccination coverage in pregnant women*
2010	304,938	196,527	64.45
2011	304,938	151,698	49.75
2012	189,333	158,159	83.53
2013	195,016	161,313	82.72
2014	194,942	164,475	84.37
2015	194,022	171,126	88.20
2016	200,108	151,624	75.77
2017	200,455	165,055	82.34
2018	190,226	161,919	85.12
2019	190,256	160,453	84.34
2020	190,256	153,764	80.82

period. There is a large variation between years: the lowest rate of vaccination coverage (49.75%) occurred in 2011 and the highest rate (88.2%) was observed in 2015. There was a stagnation of vaccination coverage rates between 2010 and 2020 (APC): 2.93 (95%CI -0.30; 6.25), and in 2020, vaccination coverage was close to the recommended rate.

Table 2 presents the trend analysis and annual variation of influenza vaccination coverage among pregnant women.

Table 2. Trend analysis and annual variation in influenza vaccine coverage among pregnant women, Minas Gerais, Brazil, 2010–2020

	Influenza Vaccination Coverage in Pregnant Women											APC (95%CI)	p-value	Trend
	Years													
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020			
Regional														
RHS Alfenas	58.53	48.64	80.36	94.73	88.94	94.80	82.50	94.82	90.84	91.93	95.53	4.94 (0.52;9.55)	0.034	Increasing
RHS Barbacena	64.50	44.69	75.19	79.72	84.16	83.95	90.45	87.52	94.48	86.58	81.82	4.4 (0.79;8.14)	0.023	Increasing
RHS Belo Horizonte	65.64	49.16	89.52	82.56	78.84	80.19	73.35	78.39	79.99	78.22	69.85	1.55 (-1.62;4.84)	0.308	Stagnation
RHS Coronel Fabriciano	67.64	51.37	76.53	74.82	75.34	88.73	68.29	77.28	80.35	81.20	83.59	2.85 (0.82;4.92)	0.012	Increasing
RHS Diamantina	49.39	43.54	80.89	78.67	93.35	84.93	83.98	85.11	84.03	81.86	93.19	5.71 (0.59;11.09)	0.034	Increasing
RHS Divinópolis	64.69	51.75	78.94	77.92	81.24	80.08	75.04	79.02	88.47	84.49	84.86	3.36 (1.12;5.65)	0.008	Increasing
RHS Governador Valadares	64.18	52.45	88.20	84.52	93.48	88.19	81.78	79.90	87.36	85.77	78.96	2.46 (-1.28;6.35)	0.179	Stagnation
RHM Itabira	63.26	51.79	78.45	82.10	86.34	81.22	68.94	71.59	74.99	81.98	78.58	2.11 (-1.35;5.7)	0.210	Stagnation
RHM Ituiutaba	72.49	57.01	103.17	99.30	100.97	86.45	81.19	92.19	86.74	87.05	71.00	0.57 (-3.71;5.04)	0.777	Stagnation
RHM Januária	59.07	42.71	87.67	90.60	102.07	86.59	80.10	87.30	95.08	87.46	87.44	4.37 (-0.92;9.95)	0.100	Stagnation
RHS Juiz de Fora	65.23	50.17	72.77	82.31	84.06	84.10	73.38	79.71	77.77	85.27	75.35	2.51 (-0.71;5.84)	0.118	Stagnation
RHM Leopoldina	70.56	72.84	86.42	78.66	86.79	79.50	72.59	75.93	86.92	80.58	83.48	0.93 (-0.64;2.53)	0.221	Stagnation
RHS Manhumirim	63.22	52.71	83.45	78.83	86.87	86.37	77.62	82.83	94.58	93.34	88.89	4.05 (1.49;6.68)	0.006	Increasing
RHS Montes Claros	55.15	45.44	77.60	81.79	93.37	160.91	64.15	89.72	89.50	81.73	85.48	4.44 (-0.46;9.58)	0.075	Stagnation
RHS Passos	66.84	48.67	80.41	91.05	86.78	94.58	90.35	95.44	86.34	96.99	90.64	4.24 (0.58;8.02)	0.029	Increasing
RHS Patos de Minas	70.97	56.24	84.76	81.32	91.09	90.68	80.67	96.41	93.98	92.97	83.38	3.18 (0.71;5.72)	0.018	Increasing
RHM Pedra Azul	53.74	51.91	87.91	78.63	83.62	89.69	78.83	86.63	92.31	101.3	97.95	5.53 (2.37;8.78)	0.003	Increasing
RHM Pirapora	60.13	46.88	75.92	80.27	96.55	81.87	68.98	74.05	98.16	84.54	84.38	3.96 (-0.22;8.33)	0.064	Stagnation
RHS Ponte Nova	47.65	41.51	76.03	77.48	80.65	76.98	77.75	82.63	95.46	92.48	79.67	6.02 (1.51;10.73)	0.015	Increasing
RHS Pouso Alegre	72.94	48.79	79.02	84.23	84.64	83.19	78.66	82.86	88.49	84.96	85.99	3.13 (0.45;5.88)	0.028	Increasing
RHM São João del-Rei	65.01	51.91	89.10	86.59	82.11	63.05	83.63	83.45	86.65	85.57	88.59	3.14 (0.14;6.23)	0.044	Increasing
RHS Sete Lagoas	58.83	42.04	82.31	85.77	85.68	83.62	72.81	75.32	87.15	91.18	85.88	4.38 (0.05;8.89)	0,050	Stagnation
RHS Teófilo Otoni	57.06	45.98	71.56	70.16	95.05	88.14	82.97	85.06	90.71	91.21	88.23	5.37 (1.6;9.29)	0,011	Increasing
RHM Úbá	61.39	56.74	81.06	80.49	83.12	85.88	81.24	88.79	89.99	92.07	94.02	4.23 (2.03;6.48)	0,002	Increasing
RHS Uberaba	83.19	64.61	93.51	93.97	95.32	95.54	84.03	90.81	95.02	91.48	87.19	1.38 (-0.84;3.67)	0,201	Stagnation
RHS Uberlândia	84.68	53.35	85.76	86.52	77.28	84.78	75.00	79.25	73.95	79.52	75.29	0.59 (-1.51;2.74)	0,549	Stagnation
RHM Unaí	61.66	53.10	94.02	85.51	79.32	83.52	70.56	80.08	97.09	89.58	105.07	4.23 (1.02;7.54)	0,016	Increasing
RHS Varginha	58.26	47.45	78.96	83.22	83.31	82.72	74.62	88.57	81.40	85.96	86.15	4.1 (0.59;7.74)	0,028	Increasing
Minas Gerais	64.45	49.75	83.53	82.72	84.37	88.20	75.77	82.34	85.12	84.34	80.82	2.93 (-0.30; 6.25)	0.074	Stagnation
Nr of regionals that reached the goal	2	0	17	19	24	25	12	5	11	10	6	---	---	---

Note: The cells where vaccination coverage reached the targets determined by the National Immunization Program are highlighted based on reference years (2010 to 2016 =80% and, after 2017, =90%). APC: *Annual Percent Change;* RHS: Regional Health Superintendencies; RHM: Regional Health Managements.

Among the 28 Regional Health Management and Regional Health Superintendency, 16 showed an increasing trend. However, considering the state as a whole, there was a stagnation trend, with an APC of 2.93 (95%CI -0.30; 6.25) and p=0.074.The spatial distribution of influenza vaccine coverage in pregnant women in the state according to Regional Health Superintendency and Regional Health Management is observed in the following figures (choropleth maps).

As shown in Figure 1A, in 2010 only two Regional Health Management/ Regional Health Superintendency reached the target established for that year, namely Uberlândia (84.68%) and Uberaba (83.19%).

As presented in Figure 1B, the regional health of Minas Gerais, Montes Claros, had the highest rate of influenza vaccination coverage in pregnant women in 2015, reaching the percentage of 160.91%. Twenty-five out of the 28 health regions reached the target of 80.00% vaccination coverage rate in 2015.

Subsequently, the scenario improved, that is, 11 Health Regionals reached this goal in 2018 (Figure 1C).

Further on, in 2020, only six Regional Health Management/Regional Health Superintendency reached the recommended target (Figure 1D).

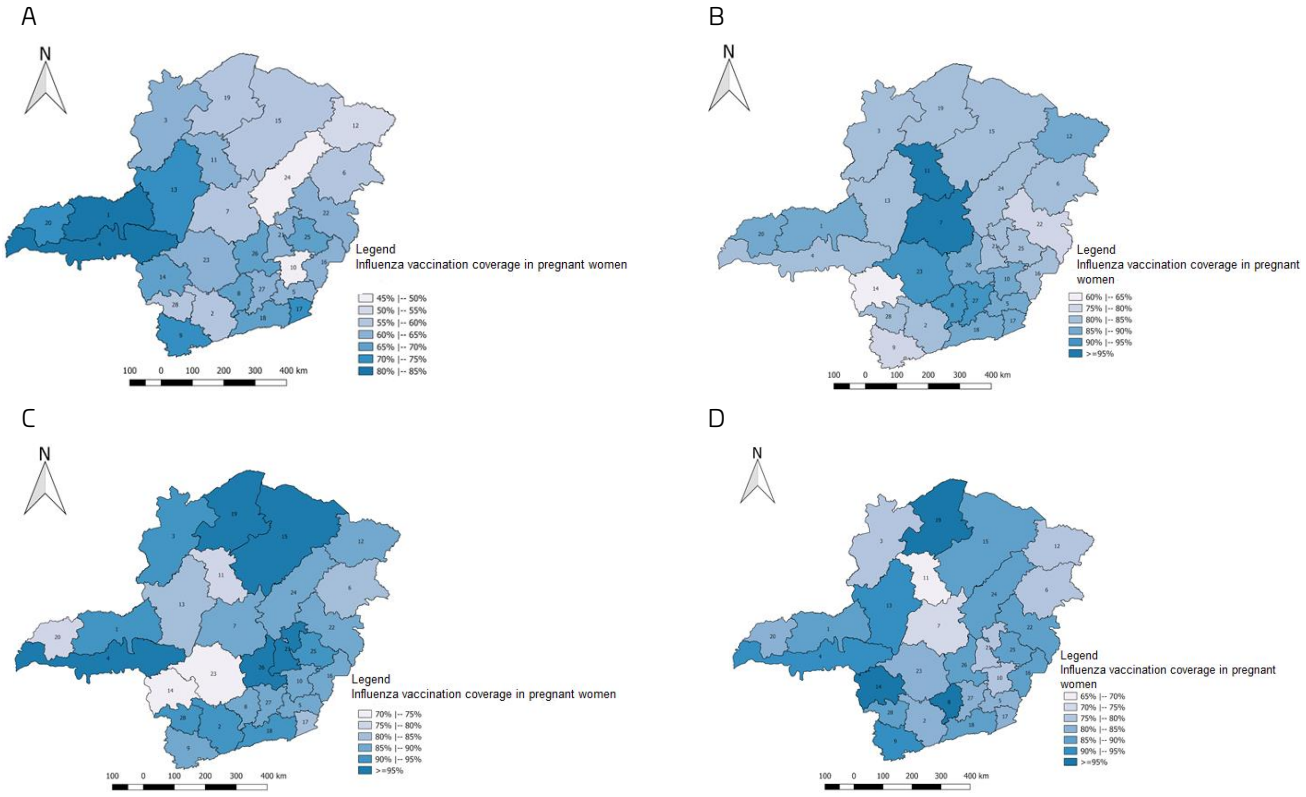
DISCUSSION

Considering the scenario as a whole, the percentage of influenza vaccination in the population of pregnant women in the 2010–2020 period showed a trend of stagnation, with vaccination coverage in the last four years (2017–2020) below the target stipulated by the Brazilian Ministry of Health, that is, less than 90%[8].

These results are similar to those found in a study that evaluated the vaccination coverage of different immunizing agents in Brazilian states, including the influenza vaccine, in which most states showed a trend of stagnation[8].

Considering the 2010-2016 period, the state of Minas Gerais showed an increase in coverage until 2016, when coverage dropped suddenly from 88.20% in 2015 to 75.77% in 2016 (Table1). At that time, there was also a drop in the vaccination coverage of this immunizer in the international scenario between 2014 and 2015[11].

Figure 1. Influenza vaccination coverage in pregnant women. Minas Gerais, Brazil, 2010 (A), 2015 (B), 2018 (C) e 2020 (D)



Note: RHM: Regional Health Management; RHS: Regional Health Superintendency. 1 – RHM Uberlândia; 2 – RHM Varginha; 3 – RHM Unaí; 4 – RHM Uberaba; 5 – RHM Ubá; 6 – RHM Teófilo Otoni; 7 – RHM Sete Lagoas; 8 – RHM São João del-Rei; 9 – RHM Pouso Alegre; 10 – RHM Ponte Nova; 11 – RHM Pirapora; 12 – RHM Pedra Azul; 13 – RHM Patos de Minas; 14 – RHM Passos; 15 – RHM Montes Claros; 16 – RHM Manhumirim; 17 – RHM Leopoldina; 18 – RHM Juiz de Fora; 19 – RHM Januária; 20 – RHM Ituiutaba; 21 – RHM Itabira; 22 – RHM Governador Valadares; 23 – RHM Divinópolis; 24 – RHM Diamantina; 25 – RHM Coronel Fabriciano; 26 – RHM Belo Horizonte; 27 – RHM Barbacena; 28 – RHM Alfenas.

The factors influencing the lower adherence of pregnant women to immunization may be related to women's low perception of the severity of disease symptoms, the lack of knowledge of the risks of non-immunization for the fetus and infant, doubts about the safety of the vaccine and lack of awareness about the importance of immunization[10]. In addition, the large number of municipalities in a state such as Minas Gerais can contribute to the variation in vaccination coverage between health regions[10].

When analyzing the priority groups of the campaign, which include children and older adults, there is good adherence to vaccination. However, when pregnant and postpartum women are evaluated, this group is below the established target, and variations in indices of the Health Regionals occur.

Fear, lack of information, myths and beliefs of the population in their representations and cultural values regarding vaccination can contribute to low vaccination coverage[4].

Another possible cause of fear of pregnant women regarding immunization may be related to adverse events after influenza vaccination. Vaccines are important tools to promote the immunization of an individual and protection of the community by reducing the spread of infectious agents and the consequences generated by vaccine-preventable diseases[17]. Like other drugs, vaccines are clearly not free from causing adverse events, commonly known as "side effects" by the general population. However, the dissemination of safety information can ensure that the advantages always exceed considerably the possible risks of vaccination[18].

Although the flu vaccine can cause mild adverse reactions, such as sensitivity and pain at the injection site, as well as systemic reactions, such as headache, myalgia, allergic reactions and fatigue, the vaccine proved to be safe for this population[19], This information needs to be properly communicated to pregnant women.

It is known that vaccination coverage is influenced by several recurrent factors, whether individual or contextual[20], considering some regions of Brazil and other parts of the world. A study developed in the city of São Paulo portrayed that pregnant women's lack of information can influence the vaccination coverage of this population, since all unvaccinated pregnant women interviewed were unaware of the importance of the vaccine for protection of the newborn. These women reported that if they had obtained this information from a health professional, they would have been immunized during pregnancy[21].

This reality is not exclusive to the Brazilian population. In a French study, data that justify non-adherence to the vaccine were similar. Low adherence was also related to pregnant women's lack of information about the complications caused by influenza during pregnancy, as well as the importance of immunization for mother and child protection[9].

Misconceptions and inaccurate and incomplete information provided by health professionals regarding vaccination also contribute to the low rates of influenza vaccination among pregnant women, as demonstrated in a study conducted in Turkey[22].

In Australia, in addition to the lack of recommendation from health professionals for influenza vaccination in pregnant women, other reasons for non-vaccination include pregnant women's concerns about the vaccine safety for the fetus[11].

Such studies[9,11,22] show that health professional recommendations about vaccination and clarification of possible fears of pregnant women about this immunizer, including information on vaccine safety, are essential to increase adherence of this population to the vaccine and consequently, reduce illness by influenza.

In the 2010–2020 period, 16 regions in this study showed an increasing trend, showing that the vaccination coverage rate of health regionals in the state of Minas Gerais are heterogeneous. In Brazil, previous studies demonstrate heterogeneity in health conditions between regions, constituting a key point for the development of disease prevention and health promotion actions[23]. Socioeconomic conditions and access to health services are determining factors in vaccination coverage, since social, economic and geographic differences promote unequal access or even the lack of access to health[24]. On the other hand, there is evidence that influenza vaccination tends to increase when pregnant women receive appropriate counselling from a health professional[25].

In view of the above, several actions can be taken to increase influenza vaccination coverage in pregnant women, such as the continuing education of health professionals involved in antenatal care and qualification of health education actions performed by them. Additionally, special attention from the multidisciplinary team is recommended for the most vulnerable groups, who started antenatal care only after the third trimester of pregnancy, clearly showing them the importance of immunization for the mother and newborn[25].

This study has some limitations arising from the use of secondary data and possible "inconsistency" in relation to the quantity and quality of its information, in addition to not having included the year 2021. However, the use of secondary data has the potential to support research on important issues to Public Health.

It is expected that this work can improve comprehensive care for pregnant women in antenatal care. Understanding the importance of health education and evidence-based guidelines is essential to minimize the negative impacts of low vaccination coverage on the health of pregnant women and encourage vaccination in this life cycle. Furthermore,

professional improvement and continuous monitoring of women in antenatal care are necessary, with adequate clarification of doubts and fears regarding various aspects in the gestational period, in particular, vaccination.

CONCLUSION

In this study, the influenza vaccination coverage in the group of pregnant women showed a trend of stagnation in Minas Gerais between years 2010 and 2020, with coverage below the recommended level. Given the small number of studies addressing the issue at the national and international level, the stimulus for further discussions on the subject is emphasized, providing better assistance to pregnant women and training of health professionals involved in this care.

The provision of enlightening and effective communication and the creation of a relationship of trust with pregnant women during antenatal consultations is part of the role of professionals involved in antenatal care. This will ensure greater acceptability of the influenza vaccine and consequently, increase the rates of vaccination coverage.

REFERENCES

1. Nuwarda RF, Alharbi AA, Kayser V. An overview of influenza viruses and vaccines. Vaccines (Basel) [Internet]. 2021 [cited on: Mar. 09, 2021];9(9):1032. Available from: https://doi.org/10.3390/vaccines9091032
2. Almeida JF, Berezin EM, Farhat CK, Cintra AO, Stein RT, Burns DAR, et al. Consenso para o Tratamento e Profilaxia da Influenza (Gripe) no Brasil. Rev Pan-Amazônica Saúde [Internet]. 2014 [cited on: Mar. 09, 2021];7(1):11-25. Available from: https://www.researchgate.net/publication/242639204_Consenso_para_o_Tratamento_e_Profilaxia_da_Influenza_Gripe_no_Brasil.
3. Ministério da Saúde [Internet]. Informe Técnico. 22ª Campanha Nacional de Vacinação contra a Influenza. 2020 [cited on: Mar. 09, 2021]. Available from: https://sbim.org.br/images/files/notas-tecnicas/informe-tecnico-ms-campanha-influenza-2020-final.pdf.
4. Passos FT, Moraes Filho IM. Movimento antivacina: revisão narrativa da literatura sobre fatores de adesão e não adesão à vacinação. Rev JRG [Internet]. 2020 [cited on: Jun. 28, 2022];3(6):170-81. Available from: http://www.revistajrg.com/index.php/jrg/article/view/.
5. World Health Organization [Internet]. Global influenza strategy 2019-2030. Geneva PP. Geneva: WHO; 2019 [cited on: Mar. 09, 2021]. Available from: https://apps.who.int/iris/handle/10665/311184
6. Benowitz I, Esposito DB, Gracey KD, Shapiro ED, Vázquez M. Influenza vaccine given to pregnant women reduces hospitalization due to influenza in their infants. Clin Infect Dis [Internet]. 2010 [cited on: Jun. 28, 2022];51(12):1355-61. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3106242/.
7. Omer SB, Clark DR, Madhi SA, Tapia MD, Nunes MC, Cutland CL, et al. Efficacy, duration of protection, birth outcomes, and infant growth associated with influenza vaccination in pregnancy: a pooled analysis of three randomised controlled trials. Lancet Respir Med [Internet]. 2020 [cited on: Jun. 28, 2022];8(6):597-608. Available from: https://www.sciencedirect.com/science/article/pii/S2213260019304795.
8. Gaujac C, Cunha RS, Amaral RC. Cobertura vacinal por influenza vírus nos estados brasileiros antes e após o COVID-19. ICSA [Internet]. 2022 [cited on: Jun. 27, 2022];8(3):486-97. Available from: https://periodicos.set.edu.br/saude/article/view/10209
9. Ministério da Saúde. Informe Técnico. 23ª Campanha Nacional de Vacinação Contra a Influenza [Internet]. 2021 [cited on: Feb. 29 2021]. Available from: https://www.gov.br/saude/pt-br/media/pdf/2021/marco/16/informe-tecnico-influenza-2021.pdf.
10. Gontijo TL, Oliveira VC, Almeida NA. Guimarães EAA. Análise da cobertura vacinal no estado de Minas Gerais. Cienc Enfer [Internet]. 2017 [cited on: Jan. 03, 2021];13(3),69-75. Available from: https://www.redalyc.org/articulo.oa?id=370455624007
11. Bartolo S, Mancel O, Deliege E, Caepentier S, Dessein R, Faure K, Subtil D. Determinants of pregnant women's knowledge about influenza and the influenza vaccine: A large, single-centre cohort study. PLoS One [Internet]. 2020 [cited on: Mar. 07, 2021]. Available from: https://doi.org/10.1371/journal.pone.0236793
12. Mak DB, Regan AK, Vo DT, Effle PV. Antenatal influenza and pertussis vaccination in Western Australia: a cross-sectional survey of vaccine uptake and influencing factors. BMC [Internet]. 2018 [cited on: Mar. 20, 2021];416-2018. Available from: https://doi.org/10.1186/s12884-018-2051-3
13. Mazagatos C, Delgado-Sanz C, Oliva J, Gherasim A, Laurrauri A. Exploring the risk of severe outcomes and the role of seasonal influenza vaccination in pregnant women hospitalized with confirmed influenza, Spain, 2010/11-2015/16. PLoS One [Internet]. 2018 [cited on: Mar. 19, 2021]. Available from: https://doi.org/10.1371/journal.pone.0200934
14. Secretaria do Estado de Minas Gerais [Internet]. Superintendências Regionais de Saúde (SRS) e Gerências Regionais de Saúde (GRS). 2021 [cited on: Mar. 19, 2021]. Available from: https://www.saude.mg.gov.br/sobre/institucional/superintendencias-regionais-de-saude-e-gerencias-regionais-de-saude

15. Antunes JLF, Cardoso MRA. Uso da análise de séries temporais em estudos epidemiológicos. Epidemiol Serv Saúde [Internet]. 2015 [cited on: Mar. 20, 2021];27(3):565-76. Available from: https://doi.org/10.5123/S1679-49742015000300024
16. Souza CDF, Feitosa C, Magalães LMAF. Transmisión de la lepra en Bahia, 2001-2015: modelado a partir de regresión por Joinpoint y estadística de barrido espacial. Epidemiol Serv Saúde [Internet]. 2019 [cited on: Mar. 19, 2021];28(1):1-12. Available from: https://doi.org/10.5123/S1679-49742019000100015
17. Patino CM, Ferreira CJ. Confidence intervals: a useful statistical tool to estimate effect sizes in the real world. J Bras Pneum [internet]. 2015 [cited on: Mar. 19, 2021];41(6):565-6. Available from: https://doi.org/10.1590/S1806-37562015000000314
18. Pan American Health Organization [Internet]. Imunização ao longo do ciclo de vida no nível da atenção primária no contexto da pandemia da COVID-19. Versão 1, 21 de maio de 2020 [cited on: Mar. 29, 2022]. Available from: https://iris.paho.org/handle/10665.2/52475
19. Nielsen H, Bronwer P. Guidance on routine immunization services during COVID-19 pandemic in the WHO European Region [Internet]. UN City, Marmorvej; 2020 [cited on: Mar. 29, 2022];51:1-12. Available from: http://www.euro.who.int/pubrequest
20. Centers for Disease Control and Prevention [Internet]. Safety of Influenza Vaccines. 2019 [cited on: Abr. 28, 2022]. Available from: https://www.cdc.gov/flu/professionals/acip/safety-vaccines.htm
21. Vieira, E. Estrutura e localização dos serviços de vacinação influenciam a disponibilidade do tríplice viral no Brasil. REME [Internet]. 2020 [cited on: Abr. 23, 2022];24:1-6. Available from: https://pesquisa.bvsalud.org/portal/resource/pt/biblio-1135981
22. Kfouri RA, Richtmann R. Vacinação contra o vírus influenza em gestantes: cobertura da vacinação e fatores associados. Einstein [Internet]. 2013 [cited on: Abr. 05, 2021];11(1):53-7. Available from: https://doi.org/10.1590/S1679-45082013000100010
23. Pulatoğlu, Ç. Turan, G. Women's knowledge and beliefs towards vaccination for influenza during pregnancy in Turkey and underlying factors of misinformation: a single-centre cross-sectional study. Cent Eur J Public Health [Internet]. 2020 [cited on: May 03, 2021];28(2):124-9. Available from: https://cejph.szu.cz/artkey/cjp-202002-0008_women-s-knowledge-and-beliefs-towards-vaccination-for-influenza-during-pregnancy-in-turkey-and-underlying-facto.php.
24. Amaral PV, Rocha TAH, Barbosa ACQ, Lein A, Vissoci JPN. Spatially balanced provision of health equipment: a cross-sectional study oriented to the identification of challenges to access promotion. Int J Equity Health [Internet]. 2017 [cited on: May 03, 2021];16(1):209. Available from: https://pubmed.ncbi.nlm.nih.gov/29202757/.
25. Mendoza-Sassi RA, Linhares AO, Schroeder FMM, Maas NM, Nomiyama S, César JA. Vacinação contra influenza em gestantes no sul do Brasil e fatores associados. Ciênc Saúde Coletiva [Internet]. 2019 [cited on: Mar. 25, 2021];24(12):4655-64. Available from: https://doi.org/10.1590/1413-812320182412.08382018