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Pentavalent Vaccine and Family Health Strategy Coverage

Cobertura vacinal da Pentavalente e da Estratégia de Saúde da Família

Cobertura de vacunación de la Pentavalente y del Programa Estrategia de Salud de la Familia

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Abstract: Objective: to evaluate Pentavalent vaccination coverage in children under one year old in the Brazilian regions and capitals and the coverage of the Family Health Strategy (FHS). **Method:** a study of a historical series with secondary data from national vaccine management systems and the FHS, from 2014 to 2018, analyzed by descriptive statistics. **Results:** the Brazilian regions have maintained Pentavalent vaccination coverage below 95% since 2017. The scope of the FHS did not significantly impact on the achievement of the recommended vaccination target. **Conclusion:** low vaccination coverage increases the risk for the reintroduction of controlled diseases. Access to the health services needs to be facilitated and vaccination prioritized when planning the actions of the FHS team. Nursing is able to create local actions to reverse this scenario, with the support of the managers to intensify campaigns and combat the causes that have hindered the achievement of the goals.
Descriptors: Vaccination Coverage; Vaccines; Primary Health Care; Family Health; Nursing

Resumo: Objetivo: avaliar a cobertura vacinal da Pentavalente em menores de um ano nas regiões e capitais brasileiras e a cobertura da Estratégia de Saúde da Família (ESF). **Método:** estudo de série histórica de dados secundários provenientes de sistemas de gestão nacional de vacinas e da ESF, no período de 2014 a 2018, analisados por estatística descritiva. **Resultados:** as regiões brasileiras mantêm a cobertura vacinal da Pentavalente abaixo de

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95%, desde 2017. A abrangência da ESF não impactou significativamente no alcance da meta vacinal preconizada. **Conclusão:** as baixas coberturas vacinais aumentam o risco de reintrodução de doenças controladas. O acesso aos serviços de saúde precisa ser facilitado e a vacinação priorizada no planejamento das ações da equipe da ESF. A enfermagem tem condições de criar ações locais para reverter este cenário, com o apoio dos gestores para intensificar campanhas e combater as causas que têm prejudicado o alcance das metas.
Descritores: Cobertura Vacinal; Vacinas; Atenção Primária à Saúde; Saúde da Família; Enfermagem

Resumen: Objetivo: evaluar la cobertura de vacunación de la Pentavalente en menores de un año en las regiones y capitales de Brasil y la cobertura de la Estrategia de Salud de la Familia (ESF). **Método:** estudio de serie histórica de datos secundarios provenientes de sistemas de administración nacional de vacunas y de la ESF, en el período de 2014 a 2018, analizados por medio de estadística descriptiva. **Resultados:** las regiones de Brasil mantienen un nivel de cobertura de vacunación de la Pentavalente por debajo del 95% desde el año 2017. La cobertura de la ESF no tuvo un efecto significativo para alcanzar la meta de vacunación recomendada. **Conclusión:** los bajos índices de cobertura de vacunación aumentan el riesgo de reintroducción de enfermedades controladas. Debe facilitarse el acceso a los servicios de salud y se debe priorizar la vacunación en la planificación de las acciones del equipo del programa ESF. El área de Enfermería tiene las condiciones necesarias para diseñar acciones locales a fin de revertir esta situación, con el apoyo de los administradores para intensificar campañas y combatir las causas que han perjudicado el alcance de las metas.
Descriptores: Cobertura de Vacunación; Vacunas; Atención Primaria de Salud; Salud de la Familia; Enfermería

Introduction

Vaccination is an immunobiological technology available in the Brazilian health system, offered in the Primary Health Care (PHC) network. Using such technology, according to the Brazilian Society of Immunizations (*Sociedade Brasileira de Imunizações*, SBIm) and to the Ministry of Health (MoH), brings several benefits to the population by the ability to prevent premature deaths, illness and hospitalizations due to preventable diseases, in addition to allowing the eradication of diseases of worldwide reach such as smallpox and polio.[1-2]

Brazil's National Immunization Program (*Programa Nacional de Imunizações*, PNI) was created in 1973, offering vaccines recommended by the World Health Organization (WHO) free of charge to the Brazilian population. In Brazil, the PNI is able to offer immunobiologicals in the most different places, such as riverside communities in the Amazon rainforest.[1] In the Brazilian context, the regulatory agency responsible for approving vaccines developed during long research processes is the National Health Surveillance Agency (*Agência Nacional de*

Vigilância Sanitária, ANVISA), whose fundamental role in the rigorous evaluation and inspection of immunobiologicals ensures the safety of the population.[2]

According to the Ministry of Health, the vaccination coverage indicator is an important management tool for decision-making at all levels of government, as it signals the growth or reduction of immunopreventable and reemerging diseases.[3] The reduction in the vaccination coverage rates has been worrying the scientific community and the government since, for immunization to be considered effective in blocking diseases, the vaccination schedule must be completed with the number of doses recommended for each type of immunobiological as well as ensure homogeneous coverage. Some causes for the decrease in coverage can be the scheduled insufficiency of some immunobiologicals in the PHC network, the dissemination of false news, the opening hours of the health units and vaccination hesitation.[4]

Vaccination hesitation occurs when the individuals delay vaccination or refuse to receive doses of some types of immunobiologicals. It is a set of behaviors that can be influenced by anti-vaccine movements, causing some people to postpone vaccination based on beliefs that justify such a decision.[5-6] Vaccine refusal occurs when the individual denies any and all types of immunobiologicals for the most varied reasons: philosophical or religious principles, sociocultural aspects, low perception of the risk of diseases, questions about the effectiveness of the vaccines and medical advice.[5]

Currently, the anti-vaccine movement gains notoriety due to society mobilization against compulsory vaccination. This movement believes that the child's immune system is unable to process the entire number of applied antigens; that vaccination causes autoimmune diseases; and that the immunization developed when acquiring the disease is more effective and safer than the vaccine. [5] The spread of false information on social media reinforces these ideas, which increases the insufficiency of blocking preventable diseases.

Vaccines are formulated from infectious agents or genetic engineering that, when introduced into the body, simulate the invasion of an infectious agent and stimulate the body to produce antibodies, creating the immune memory capable of positively responding when it comes in contact with the real aggressor.[7] An important vaccine conjugated to a single immunobiological and present in the child's vaccination schedule is the Pentavalent, which protects against diphtheria, tetanus, whooping cough, hepatitis B and *Haemophilus influenzae b.* The basic application scheme is carried out with three doses: at two, at four and at six months old, with the recommendation of the Ministry of Health limiting the coverage to be greater than 95%.[3]

At the global level, there is a global plan of action for vaccination (2011-2020) which foresees that all countries achieve vaccination coverage greater than or equal to 90% in all vaccines. The WHO and the United Nations Children's Fund (UNICEF) are involved in this monitoring and advocate actions to improve vaccine coverage in order to achieve the goal. Worldwide, the DTP vaccine (diphtheria, tetanus toxoid and pertussis) had a coverage of 84% in 2010 and reached 86% in 2018, which represents a slight increase of 2.38%. The coverage of the third dose of DTP is the main indicator of the effectiveness of an immunization program.[8]

The nursing team is responsible for the vaccine room and for the entire process of storage, preparation and application of immunobiologicals in PHC, in addition to the control of vaccination coverage, search for missings and the appropriate electronic and manual records, measures that guarantee the quality of the immunobiologicals up to the end user.[9] Nursing assistants and technicians are in charge for carrying out routine activities, putting into practice all the technical norms and guidelines of the PNI, while nurses are assigned the role of technical responsibility for the vaccination room, supervision, continuing education and implementation of actions to reach vaccination coverage.[10-11]

The Family Health Strategy (FHS) is considered the main tool for expanding PHC coverage in Brazil. The calculation for the FHS coverage (cESF) is performed by multiplying the

number of teams by 3,450 users, dividing the result by the estimated population. Worldwide, the countries use the number of users registered and assigned to a team or physician.[12]

Starting from the calculation of the scope of the FHS associated with vaccination coverage in the same territory, it becomes possible to observe: the implementation of new FHS teams by the municipal manager; actions to reduce the occurrence of preventable diseases; and the quality of the services offered. The vaccination goal is an important indicator to compare with the occurrence of vaccine-preventable diseases in the population, as well as the qualification of the health team's work process.[4] In this sense, the FHS team that serves users in their territory knows the population profile and extends the care of the health unit at home. In this way, it has conditions to establish actions that welcome and value the maintenance of the complete vaccination schedule.[9] It is thus inferred that the higher the cESF indicator in the municipality, the more qualified the work process of the health team is, as it is possible to develop relevant actions that are configured in strategies for the reduction of diseases, with the immunopreventable ones standing out.

In view of the above about the importance of immunization, the growth of immunopreventable and reemerging diseases in the national territory and the adoption of the FHS as a priority model to offer health to the Brazilian population – linking the user to a health team – the research question was set forth: How is the vaccine coverage of the Pentavalent immunobiological agent in children under one year old in the Brazilian regions and capitals, and how is the cESF being presented in these places? The objective of this study is to evaluate Pentavalent vaccination coverage (cvP) in children under one year old in the Brazilian regions and capitals and the cESF.

Method

This is an epidemiological study, of a historical series, carried out using secondary data generated in the register of vaccination rooms in the PHC network and launched in the Information System of the National Immunization Program (SI-PNI), which is managed by the PNI and the MoH. Access to data was provided by the Department of Informatics of the Unified Health System (DATASUS). The cESF data, on the other hand, come from the National Health Establishment Registration System (*Sistema de Cadastro Nacional de Estabelecimento de Saúde*, SCNES) and the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística*, IBGE), which were extracted from the Primary Care Information and Management System (e-Gestor AB).[13-14]

Regarding vaccination coverage, the selection criteria in DATASUS were as follows: vaccination coverage, geographic area (Brazil, regions and capitals), immunobiological Pentavalent in the period from 2014 to 2018. Data collection took place between October and December 2019, according to the variables defined by availability in DATASUS. Regarding the FHS, the criteria selected in the e-Gestor AB were the following: Brazilian capitals and percentage of cESF in the same period. The path taken in e-Gestor AB for selecting the variables was as follows: public reports, history of primary care coverage, and selection of consultation options. Such a time interval was determined due to the fact that it presents updated data at the time of data collection in both systems.

Data was saved in *Microsoft® Excel* 2016 spreadsheets and analyzed in the same program by means of descriptive statistics, using absolute and relative frequencies. The results are displayed using a table to illustrate the immunobiological vaccine coverage and family health coverage in the Brazilian capitals. As these are two public domain databases, it was not necessary to submit this research to the Research Ethics Committee. Anyway, this research respects the ethical precepts based on Resolution No. 466/2012 of the National Health Council.[15]

Results

Table 1 shows the vaccine coverage for the Pentavalent immunobiological agent administered to children less than one year old, in the North Region and its capitals and cESF, in the period from 2014 to 2018.

Table 1 – Pentavalent vaccination coverage (cvP) in children under one year old and Family Health coverage (cESF), in the Northern Region and capitals, from 2014 to 2018.

Region/Capitals		2014 %	2015 %	2016 %	2017 %	2018 %
North	cvP*	86.50	85.08	78.24	72.63	71.14
Belém	cvP	84.07	52.31	71.46	62.08	58.95
	cESF**	22.38	22.73	24.62	23.80	23.61
Boa Vista	cvP	79.60	98.71	92.29	97.54	76.17
	cESF	58.43	55.88	58.67	57.07	56.37
Macapá	cvP	72.54	87.69	101.11	57.77	57.67
	cESF	58.97	63.96	61.63	38.91	52.38
Manaus	cvP	86.74	98.61	96.23	76.66	74.09
	cESF	31.90	33.40	30.19	26.51	29.77
Palmas	cvP	93.46	104.23	84.16	77.02	82.96
	cESF	82.71	83.73	90.16	99.88	99.87
Porto Velho	cvP	97.28	96.85	97.17	105.79	107.86
	cESF	54.00	53.77	55.98	51.62	51.58
Rio Branco	cvP	66.02	87.59	78.84	78.42	67.46
	cESF	50.14	56.01	58.12	58.79	56.53

Source: SI-PNI (2019) and MS/SAPS/Basic Care Department – DAB (2019)
Notes: *cvP - Pentavalent vaccination coverage; **cESF - Family Health Coverage.

From the five Brazilian regions, the Northern Region (Table 1) was the one with the lowest cvP (71.14%) globally; however, this same indicator was higher in the capitals Boa Vista,

Manaus, Palmas and Porto Velho. The capital Porto Velho stands out, where cvP increased by 10.58% when comparing the data from 2014 and 2018, and cESF decreased by 2.42%. On the other hand, the capitals of that Region that showed a decline in Pentavalent vaccination coverage and an increase in cESF were, respectively, Palmas (10.50% and 17.16%) and Belém (25.12% and 1.23%). The other capitals of the North Region showed a decline in cvP and cESF, respectively: Boa Vista (3.43% and 2.06%), Manaus (12.65% and 2.13%) and Macapá (14.87% and 6.59%).

The capital Porto Velho obtained the best vaccination coverage in the North Region for the entire period, remaining above the goal recommended in all the studied years. It should be noted that, in this capital, there was a 2.42% reduction in cESF, which demonstrates that the achievement of the vaccine goal is not directly related to this health care model. The other capital, Rio Branco, although it does not have the best coverage indicators, showed a growth of 1.44% in cvP and of 6.39% in cESF.

In the capitals Macapá and Belém, a decline in cvP was observed, which in 2018 remained around 58%. The cESF in these capitals is opposed, with a modest growth in Belém, while in Macapá there was a reduction in this indicator in the five years evaluated. Therefore, it is possible to infer that low vaccination coverage can be related to cESF in these federative units. Table 2 shows the vaccine coverage for the Pentavalent immunobiological agent administered to children under one year old, in the Northeast Region and its capitals and cESF, from 2014 to 2018.

Table 2 – Pentavalent vaccine coverage (cvP) in children under one year old and Family Health coverage (cESF), in the Northeast region and capitals, from 2014 to 2018.

Region/Capitals		**2014 %**	**2015 %**	**2016 %**	**2017 %**	**2018 %**
Northeast	cvP*	93.06	95.93	86.21	81.02	89.47
Aracaju	cvP	87.21	93.81	64.34	66.75	76.97
	cESF**	76.81	74.11	70.79	64.40	65.32

Fortaleza	cvP	86.99	104.99	133.41	83.69	124.90
	cESF	42.61	46.83	48.39	48.12	46.32
João Pessoa	cvP	92.23	83.56	78.18	70.30	85.84
	cESF	79.45	78.65	81.55	83.26	82.14
Maceió	cvP	77.18	78.87	76.14	66.79	79.31
	cESF	29.47	29.51	29.24	28.78	28.03
Natal	cvP	74.79	80.66	77.19	44.29	100.28
	cESF	47.53	46.08	41.54	33.19	38.64
Recife	cvP	90.30	96.29	93.80	84.87	90.02
	cESF	53.25	51.94	54.01	56.24	55.68
Salvador	cvP	90.42	95.13	87.31	83.85	78.09
	cESF	22.61	25.97	27.78	27.70	27.19
São Luís	cvP	77.95	87.20	85.13	76.47	62.74
	cESF	33.86	35.51	32.93	34.99	34.73
Teresina	cvP	84.78	76.35	76.69	63.69	75.37
	cESF	98.44	99.67	99.36	99.57	100.00

Source: SI-PNI (2019) and MS/SAPS/Basic Care Department – DAB (2019)
Notes: *cvP - Pentavalent vaccination coverage; **cESF - Family Health Coverage.

In Table 2, the capitals Fortaleza, Natal and Recife display a cvP indicator higher than the indicator of the Northeast Region (89.47%) in 2018. The capital of Ceará – Fortaleza – presented growth of cvP (37.91%) and FHS (3.71%), while in the capital Aracaju, there was a decline in both indicators (10.24% and 11.49%) when comparing the years 2014 and 2018. The capitals Natal and Maceió showed an increase in cvP, being 25.79% and 2.13%, respectively, but a decrease in cESF (8.89% in Natal, and 1.44% in Maceió). The other northeastern capitals showed a decline in cvP and expanded cESF in the same comparison and in the same order of

indicators: Recife (0.28% and 2.43%), João Pessoa (6.39% and 2.69%), Teresina (9.41% and 1.56%), Salvador (12.33% and 4.58 %) and São Luís (15.21% and 0.87%).

The capital Fortaleza showed the best cvP results, reaching rates above 100% in 2015, 2016 and 2018, while the capital of Natal – Natal – presented very divergent data in relation to cvP, having in 2017 the worst result in the Northeast Region with 44.29%, and in 2018, 100.28%, which points out that there were incentives and work in the capital to improve vaccination coverage. However, cESF in 2017 in the capital was 33.19%, which, with incentives, rose to 38.64%; however, compared to 2014 and 2018, this indicator declined. Despite the discreet growth of cESF, it may have positively contributed to the improvement for the vaccination goal, adding to the other health actions carried out.

Table 3 – Pentavalent vaccine coverage (cvP) in children under one year old and Family Health coverage (cESF), in the Midwest region and capitals, from 2014 to 2018.

Region/Capitals		2014 %	2015 %	2016 %	2017 %	2018 %
Midwest	cvP*	101.62	95.17	99.95	83.56	87.48
Brasília	cvP	92.60	66.43	140.25	84.66	86.26
	cESF**	28.25	29.01	29.03	30.77	43.29
Campo Grande	cvP	91.84	98.74	99.96	93.14	93.16
	cESF	36.54	36.28	36.25	35.99	47.65
Cuiabá	cvP	86.73	91.39	86.64	81.16	73.60
	cESF	37.23	37.58	37.68	39.87	42.04
Goiânia	cvP	87.76	83.46	77.53	72.77	81.08
	cESF	45.52	44.80	41.76	39.34	45.01

Source: SI-PNI (2019) and MS/SAPS/Basic Care Department – DAB (2019)
Notes: *cvP - Pentavalent vaccination coverage; **cESF - Family Health Coverage.

The capitals Aracaju, João Pessoa, Maceió, São Luís and Teresina kept the cvP throughout the period evaluated always below the target of 95%, with Maceió standing out with the indicator in a constant ranging from 66.79% to 79.31%. The capital of Piauí – Teresina – showed a reduction in cvP in the comparison of the years and, on the other hand, it was observed that cESF in 2018 reached 100% of its territory. Table 3 shows the vaccine coverage for the Pentavalent immunobiological agent administered to children under one year old, in the Midwest Region and its capitals and cESF, in the period from 2014 to 2018.

The capital Campo Grande stood out with a more homogeneous cvP, with results above 90% in all the years analyzed, being the only one in the Midwest Region (Table 3), in 2018, whose indicator (93.16%) is higher than the regional (87.48%). Even in this capital, this indicator showed a slight increase of 1.32% in the comparison between 2014 and 2018. The incentives for expanding cESF led the indicator to reach 47.65%.

The other capitals, Brasília and Cuiabá, showed a decline in cvP when evaluating the years 2014 and 2018, being 6.34% and 13.13% respectively. In relation to cESF, it was observed that in Brasília there was an increase of 15.04% in the indicator, and in Cuiabá, the increase was 4.81%. However, in the capital Goiânia, this indicator remained constant over the period studied (45%). Table 4 shows the vaccine coverage for the Pentavalent immunobiological agent administered to children under one year old, in the North Region and its capitals and cESF, in the period from 2014 to 2018.

Table 4 – Pentavalent vaccination coverage (cvP) in children under one year old and Family Health coverage (cESF), in the Northern Region and capitals, from 2014 to 2018.

Region/Capitals		2014 %	2015 %	2016 %	2017 %	2018 %
Southeast	cvP*	96.19	99.13	91.36	87.74	92.25
Belo Horizonte	cvP	57.24	85.23	94.86	84.10	90.06
	cESF**	76.11	78.87	78.76	77.60	77.15
Rio de Janeiro	cvP	96.92	99.48	104.50	108.50	97.64
	cESF	42.11	43.04	51.56	62.63	60.99
São Paulo	cvP	91.45	94.77	76.25	77.03	92.18
	cESF	33.08	31.67	33.91	34.54	36.22
Vitória	cvP	109.08	93.11	105.58	94.98	95.42
	cESF	73.22	74.06	72.00	72.33	70.06

Source: SI-PNI (2019) and MS/SAPS/Basic Care Department – DAB (2019)
Notes: *cvP - Pentavalent vaccination coverage; **cESF - Family Health Coverage.

The Southeast Region (Table 4) maintained vaccination coverage above 90%, except in 2017 (87.74%). Rio de Janeiro and Vitória displayed the best cvP indicators in the years evaluated, reaching 108.50% in Rio de Janeiro (2017) and 109.8% in Vitória (2014). In relation to cESF, the cities of Rio de Janeiro and São Paulo showed an increase of 18.88% and 3.14%, respectively.

The capital of São Paulo showed a decrease in cvP in 2016 and 2017, followed by an improvement in coverage in 2018 reaching an indicator above 92%. In relation to cESF, this capital has the worst indicator in the Southeast Region. However, it was observed that there was a slight increase in cESF (3.14%) between 2014 and 2018. Table 5 shows the vaccine coverage for the Pentavalent immunobiological agent administered to children under one year old, in the North Region and its capitals and cESF, in the period from 2014 to 2018.

Table 5 – Pentavalent vaccination coverage (cvP) in children under one year old and Family Health coverage (cESF), in the Northern Region and capitals, from 2014 to 2018.

Region/Capitals		2014 %	2015 %	2016 %	2017 %	2018 %
South	cvP*	97.36	98.40	91.80	87.14	89.52
Curitiba	cvP	90.71	95.93	96.01	88.12	93.56
	cESF**	43.96	42.94	41.32	39.27	34.86
Florianópolis	cvP	86.37	83.71	90.54	10.58	77.62
	cESF	90.57	95.37	98.79	96.00	76.28
Porto Alegre	cvP	82.46	78.86	71.59	75.90	74.39
	cESF	38.35	41.63	45.00	46.33	53.87

Source: SI-PNI (2019) and MS/SAPS/Basic Care Department – DAB (2019)
Notes: *cvP - Pentavalent vaccination coverage; **cESF - Family Health Coverage.

Table 5 for the South Region reveals that the capitals Florianópolis (8.75%) and Porto Alegre (8.07%) showed a decline in vaccination coverage compared to the indicators reached in 2014 and 2018. The capital Curitiba, in 2018, obtained the cvP indicator of 93.56%, surpassing the indicator for the South Region (89.52%). Although Curitiba has the best cvP in all the years evaluated, there is a 9.10% reduction in cESF. In 2017, Florianópolis had one of the worst vaccination coverage in Brazil (10.58%). This low indicator resulted from the failure to send data during the implementation of the Information System of the National Immunization Program (*Sistema de Informações do Programa Nacional de Imunizações*, SIPNI) in the period from 2016 to 2017.

The Midwest Region had the best cvP in 2014 and 2016, the Northeast Region reached the goal only in 2015, and the South and Southeast Regions did so in 2014 and 2015. Data indicate that cvP was below 95% in all the Brazilian regions since 2017, ranging from 71.14% to 92.25%. The North Region maintained its target always lower than recommended and with the lowest coverage in 2018. In Brazil, cvP was reduced by 6.41% in 2018 compared to 2014. This

decline was different in all the Brazilian regions: North 14.36%, Center-West 14.14%, South 7.84%; Southeast 3.94%, and Northeast 3.59%.

Discussion

In Brazil, vaccine hesitation has been damaging vaccination since, in the 1990s, Brazilian vaccine coverage exceeded 95%, a fact that enabled the control and eradication of some infectious diseases, proving the success of the PNI.[16] Over time and with the advancement of the communication networks and social media, several false news about vaccination have spread, which may have contributed to the drop in coverage.[7]

In 2016, the PAHO provided Brazil with the certificate for eliminating the circulation of the measles virus. In the following years, due to the low vaccination coverage of the Triple Viral virus (which protects against Measles, Mumps and Rubella) and to the migratory movements from neighboring countries, measles was reintroduced and an outbreak was recorded in 2018, with more than a thousand confirmed cases, which led to loss of the certification. This fact confirms that low vaccination coverage is a risk for the health of the population.[17]

Thus, the control of vaccine-preventable diseases can be achieved, provided that managers and health professionals make the commitment through an organized and efficient health services network associated with the competent surveillance system that is capable of triggering rapid health actions.[16] However, it is believed that several factors can contribute to the real vaccination coverage, such as: access and opening hours for health services; vaccination hesitation for fear of pain or discomfort when applying the vaccine; the amount of immunobiologicals and doses to be applied; and the reprimand from the parents/guardians regarding the vaccination delay; among others.[18]

Among the factors mentioned above, it is verified that the reprimand that parents or guardians are afraid to receive from the health team due to possible delays in vaccinating

children can certainly contribute to vaccination hesitation and/or reinforce this conduct. Therefore, it is important to understand this feeling caused by stigmatization and work to deconstruct this behavior, emphasizing the importance of vaccination to protect children.[17] As parents or guardians have increasingly sought information on the most diverse subjects, including health, on social networks such as *Facebook*, this means of communication is very useful for disseminating health information and encouraging vaccination; however, this ease of access can also cause a different effect than desired and thus contribute to the increase in vaccine hesitation because, unfortunately, the anti-vaccine movement conveys various false information about vaccines that are passed on without content certification.[17,19-20]

Therefore, government officials need to anticipate, monitor and organize actions to combat the spread of false news, called *Fake News*, and should always answer any doubts to be clarified, in order to guarantee the promotion and protection of the population. Given the propagation speed of false information, the Brazilian government faces the fight against *Fake News* making the number +55 61-99289-4640 available to serve the population via *WhatsApp.* This digital feature is available for smartphones, being possible to send and receive audio messages, videos, and photos, among other possibilities. The aim of the MoH is for the population to verify the veracity of the information before sharing it, and to alert them against the health risk of disclosing and believing in incorrect information.[21]

Through research, a better understanding of what happens in the identification and solution of possible problems is obtained. For example, it is emphasized that combined vaccines are an important resource to minimize the number of applications, since a single vaccine, such as the Pentavalent, can protect against several diseases, in addition to reducing costs and improving the adherence of parents and guardians.[22]

Another study carried out in a municipality in 2017 in the Northwest of the state of Rio Grande do Sul verified a decline in the vaccination coverage indicators with full coverage of the

FHS teams across the territory, active searches by community health agents, and national and local campaigns. Fifteen nursing professionals were observed in eight vaccination rooms in FHS units, totaling 106 observations related to immunobiological records, which can contribute to low vaccination coverage: 49.1% of the users got vaccines outside the age range recommended by the vaccination schedule; 13.2% of users received the vaccination card after its filling out by the professional without scheduling doses or vaccines; 17.8% did not receive guidelines on the vaccines scheduled on the vaccination card; 1.9% did not have the correct registration of the vaccine applied on the vaccination card; 16% of the professionals did not correctly fill out the data in the PNI; and 11.3% of the applications were postponed by the decision of the nursing professional.[23]

Another study carried out on failure in vaccination coverage took place in Sergipe (Northeast Region), where the vaccination situation of children under two years old was investigated to verify the risk of vaccine-preventable diseases. The study pointed out a high risk for vaccine-preventable diseases, as only 46.7% of the Sergipe's municipalities reached the vaccination target in 2017. These results alert to the need for intervention to modify the risk scenario for reintroduction of controlled diseases.[24]

Global data for 2018 shows that 14% of children have not completed the DTP vaccination schedule. Among these children, 70% did not receive any dose of the vaccine, adding up to 19.4 million children unprotected against these diseases. Another important fact is that 29% of these children live in India and Nigeria, places with precarious socio-health and economic conditions. Undoubtedly, strategies to achieve vaccination coverage must be developed in order to reach this unvaccinated population, so as to raise awareness among the population about the importance of immunizations and to break down barriers to vaccine refusal.[8]

Although the FHS is the priority model for health care in Brazil, this study showed that greater coverage of the FHS did not necessarily impact on the achievement of the goals of this vaccine (above 95%) as recommended by the PNI. The results indicate the proposal of new

research studies to find the barriers and practicalities in Brazilian capitals with insufficient FHS coverage and presenting adequate vaccination coverage, in addition to the capitals with excellent FHS coverage and vaccination well below the recommended.

In turn, the performance of the nursing team plays an important role in the PNI because of all its management, supervision and execution of immunobiologicals in the FHS.[3] The work process of the health team in the FHS, especially of the nursing professionals, is fraught with constant challenges in relation to immunization activities, which requires the programming and development of actions that rescue patients with vaccine delays; thus, it becomes possible to achieve the recommended coverage. In this sense, the relevance of the role of Nursing in guiding the importance of individual and collective immunization, as well as the danger for false news, is emphasized. Such measures help to guarantee population immunization in the territory in question. Therefore, the nurse, as the technician responsible for the vaccination room, needs to develop a proactive attitude through educational actions by the health team in the FHS in view of the vaccination coverage indicators.[6,11,19,23,25]

Given such situation of the cvP indicator in different Brazilian regions and capitals, the need for all capitals to share successful health actions in vaccination has been unveiled. Certainly, it is a collaborative network work that allows joining efforts to raise awareness of the population about vaccination and to implement strategies that aim to improve the vaccination hesitation to reach the recommended goal and, in this way, avoid immunopreventable diseases and infant mortality.

As for the limitations found in this study, there is a lack of Brazilian scientific production on the topic except for the manuals and epidemiological bulletins of health surveillance of the MoH. With regard to DATASUS and e-Gestor AB, they are subjected to updates, which can cause changes in the information. Furthermore, the reliability of the data depends on the appropriate electronic or manual registration process in the local systems, which represents underreporting.

Conclusion

This paper intended to evaluate the vaccine coverage of the Pentavalent immunobiological agent in children under one year old and cESF in the Brazilian scenario, from 2014 to 2018. Since 2017, no Brazilian region has reached the recommended goal of 95% cvP, signaling the need to rethink the strategies of health actions for vaccination of the population.

Among the capitals that reached the recommended goal in 2018, Porto Velho, Fortaleza, Natal, Rio de Janeiro and Vitória were noted. However, the capitals that showed the existence of health actions to increase this indicator, in the comparison between 2014 and 2018, were Porto Velho, Rio Branco, Fortaleza, Maceió, Natal, Campo Grande, Belo Horizonte, São Paulo, Rio de Janeiro and Curitiba.

In six capitals, cvP and cESF expanded in the comparison between 2014 and 2018: Rio Branco, Fortaleza, Campo Grande, Belo Horizonte, Rio de Janeiro and São Paulo. However, some capitals invested in the expansion of cESF, when comparing the indicators of 2014 and 2018, namely: Belém, Palmas, João Pessoa, Recife, Salvador, São Luís, Teresina, Brasília, Cuiabá, and Porto Alegre.

Undoubtedly, access to the health services needs to be facilitated, and vaccination should always be prioritized when planning PHC actions. In this way, opportunities are not missed to vaccinate all users who seek the health service, regardless of their place of residence. The nursing team is responsible for the vaccination room and for creating strategies at the local level to achieve its goal, such as: search for missings, vaccination campaign, health education, extramural activities, and adequate records in information systems, among others.

In addition, the role of the FHS teams should be revisited, seeking to intensify disease prevention and health promotion actions. All team members must work in an integrated, shared and collaborative way, clarifying all doubts of the population and encouraging vaccination.

Undoubtedly, of all the possible causes for vaccination delay and the scenario of cESF presented in this research, it is believed that Brazil has a long path ahead to resume the increase in this indicator of vaccine coverage and ensure the protection of the population. Thus, there would be a reduction in early mortality and health costs related to clinical care and hospitalizations resulting from these preventable diseases.

Given the magnitude of the results found, it is recommended that new studies be developed to verify *in loco* the reasons and factors that can be interfering in each Brazilian Region and Capital that explain vaccination delay and hesitation. Given the importance of nurses in the immunizations, it is suggested that these professionals are at the forefront of new research studies expanding the knowledge of Nursing on this scenario. Public agencies, on the other hand, must be attentive and intensify their actions in immunizations, as well as combating the causes that have hindered the achievement of vaccine goals.

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