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IMPACT OF VACCINATION AND THE ANTI-VACCINE MOVEMENT ON HEALTH IN BRAZIL RECORDED IN 2018

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Abstract: The impact of the anti-vaccine movement on health in Brazil, recorded in 2018, is a study that aims to record the consequences in Brazil of a trend that has spread around the world. Identifying the beneficial and harmful attributions of vaccines, the methodology of the study is based on a type of bibliographical research with a qualitative theoretical approach, using published scientific studies as a source. The results of the studies were the product of the analysis of 20 articles, with the conclusion that reinforces the idea that vaccinating is defending health and life.
Keywords: Vaccines, Anti-vaccine movement, beneficial to health.

INTRODUCTION

Today, in the 21st century, after great advances in medical technology, genetics, industry and scientific studies, we have moved from an era full of health challenges to one in which we are better able to combat the diseases that at one time claimed millions of lives around the world. In 1798, Edward Jenner published a study that would change the lives of millions of people and take the meaning of preventive health to an extraordinary level. The smallpox vaccine was developed over two hundred years ago by Edward Jenner[1] . It wasn't until almost a century later (1885) that Louis Pasteur developed a new product against rabies and called it a vaccine, in honor of Jenner. Smallpox was the first infectious disease to be wiped off the face of the earth by preventive vaccination. The history of the anti-varicella vaccine deserves to be remembered for the magnitude of the victory achieved and for the hope that the method has given us of achieving the eradication of other infectious diseases (Ministry of Health, 2004). The roots of a study published in England grew into a worldwide trend called the anti-vaccine movement. In 1998, British doctor Andrew Wakefeld published a study in the renowned scientific journal The Lancet which consisted of analyzing 12 children with autism. Of these, eight showed symptoms of the syndrome two weeks after receiving the triple virus. According to the doctor, these children's immune systems went haywire after excessive stimuli (Revista Médico em Dia - July / August 2017). This study aims to identify and record the impact of the anti-vaccine movement and vaccines, with the aim of raising public awareness and being able to learn history from published scientific facts and studies of great weight in science.

RESEARCH PROBLEM:

- What is the Impact of Vaccination and the Anti-Vaccine Movement on Health in Brazil in 2018?

JUSTIFICATION:

At the beginning of the 21st century, a trend that started in Europe was gaining more and more momentum and ended up influencing much of the world.

This trend, along with other ideologies, has spread throughout the world of globalization and has had major repercussions in the area of public health to this day; repercussions that go beyond the borders of countries and put health at risk, especially for children and adolescents.

Anti-vaccine movements are on the rise and today we are reaping the fruits of misinformation and disregard for what were once major epidemics. The control of many infectious and contagious diseases is thanks to vaccines. Those diseases that once wiped out the lives of thousands of people all over the world, today due to the growth of medical technology, many of these diseases are only seen in photographs in books or history books. It's important to stop and look back at what was once part of our reality, and because of vaccines is no longer so today.

For this reason, this study aims to awaken the general population, especially parents, to the true importance of vaccinating their children. It's not just a personal issue, it's more of a social issue, because as infectious diseases, they must be controlled so that they don't spread.

With this, the intention is to present a concept that can be made aware of and put into practice, as well as being disseminated and known, and not obtained by a decision that damages collective health.

Today the world is experiencing the height of globalization and the internet, but like any medium it can bring with it good repercussions and others that are a risk to health, such as negative information from unknown sources that try to go viral on the internet media.

Vaccines are a means of primary prevention and it's best to seek professional advice.

GENERAL OBJECTIVE:

- Record the impacts of Vaccination and the Anti-Vaccine Movement on Health in Brazil in 2018.

SPECIFIC OBJECTIVES:

- Defining the beginning of Vaccination and the Anti-Vaccine Movement in the world and in Brazil.
- Identify the beneficial and harmful roles of vaccination in the world of health.
- Document the consequences of the anti-vaccine movement on health.

METHODOLOGY:

The study methodology is based on a type of bibliographical research with a qualitative theoretical approach, using as a source scientific studies published on websites such as SCIELO, PUBMED, REVISTA DE SAUDE PUBLICA, BBS and others.

LITERATURE REVIEW

CHAPTER 1

THE BEGINNING OF VACCINES AND THE ANTI-VACCINE MOVEMENT IN THE WORLD AND BRAZIL

In the fight against smallpox, oriental peoples used the so-called "variolization" more than a thousand years ago, which consisted of inoculating material taken from the pustules of a sick person onto the skin of a healthy individual. The latter acquired the disease in a milder form than through natural contagion. However, despite its relative benignity, the disease manifested itself with all its symptoms, sometimes leaving scars on the face and body of those inoculated. The method of variolization spread to the countries of the West in the 18th century, thanks above all to the wife of the English ambassador in Constantinople, Lady Montagu, famous for her beauty and elegance, who was affected by smallpox. In 1717, she inoculated her three-year-old son and, in 1721, back in England, her five-year-old daughter. The English royal court took an interest in the method, which came to be called Byzantine, alluding to Byzantium, the former name of Constantinople (now Istanbul).

Variolization spread rapidly in England and had illustrious advocates in other countries, such as Von Haller in Germany, Voltaire in France, and Benjamin Franklin in the United States (Ujvari, 2003, pp. 130-134).

Having undergone variolization himself as a child, what impressed him most was not so much the inoculation itself, but the preparations for it, which consisted of bloodletting, purgatives and a starvation diet. In the Gloucestershire region of England, where the city of Berkeley is located, cattle were often afflicted with a disease that bore some resemblance to human smallpox, known as

cowpox. The cows affected by this disease had vesicles and pustules on their udders and the people who milked them acquired the disease, showing similar lesions on their hands, which disappeared spontaneously. It was common knowledge among the rural population that people who acquired cowpox were protected from smallpox. Determined to study medicine, Jenner initially attended the service of a well-known doctor, Ludlow, in Sodbury, where he once heard a patient say: "I can't have smallpox, because I've already had cowpox". This phrase stuck in his memory and was the leitmotif of all his observations in later years. Moving to London to continue his studies, he met the surgeon and great researcher John Hunter, whose beloved disciple he became and from whom he acquired a taste for meticulous observation and scientific research. Returning to practice in Berkeley, the idea of protecting people from smallpox by means of cowpox became an obsession. For twenty years, Jenner patiently collected observations showing that individuals previously infected with the bovine disease were refractory to smallpox. In May 1796, he carried out his definitive experiment. A woman named Sara Nelmes had acquired cowpox by milking sick cows. Jenner inoculated the lymph taken from a vesicle in Sara Nelmes' right hand onto the skin of the arm of an eight-year-old boy named Jacobo Phipps. The child developed the well-known erythematous-pustular reaction at the site of the scarification and few general symptoms. After six weeks, Jenner inoculated the pus of human smallpox into the child, who did not acquire the disease. The anti-varicella vaccine had been discovered. It wasn't until 1798, after he had successfully inoculated three more patients, that he made his first communication to the Royal Society in London, of which he was a member. In response, he received a warning that "he should take care of the good reputation he enjoyed in the society for his previous communications and that he should not risk his name by exposing to the learned Society anything that was at variance with established knowledge". Jenner's previous communications to which the Royal Society referred concerned the natural history of the cuckoo, a common bird in Europe. The attitude of the Royal Society, a respected scientific institution, may seem ridiculous today. In every age, however, great innovations are received with reserve and even hostility by their contemporaries. Jenner's own friends in Berkeley and London opposed the idea of inoculating human beings with the bovine vaccine. Jenner was even ridiculed.

He then decided to publish the results of his observations on his own, without the approval of the Royal Society, which he did in a small 74-page book entitled An Inquiry into the Causes and Effects of the Variolae Vaccinae, a Disease Discovered in Some of the Western Counties of England, Particularly Gloucestershire and Known by the Name of Cowpox (Friedman and Friedland, op. cit.). cit.)

Smallpox was the first infectious disease to be wiped off the face of the earth by preventive vaccination. The history of the anti-varicella vaccine deserves to be remembered for the magnitude of the victory achieved and the hope that the method has brought us in terms of eradicating other infectious diseases. Until the end of the 18th century, smallpox was a true human scourge, claiming lives or disfiguring the faces of survivors with indelible scars and loss of sight. It is estimated that in the 18th century there were sixty million victims of smallpox in Europe alone (Ministry of Health, 2004).

In Brazil, the reform carried out by Health Minister Rocha Lagoa in 1970 established the National Department of Prophylaxis and Disease Control, and for the interior, the National Division of Epidemiology

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and Health Statistics (DNEES). Until then, vaccination activities had been divided: while some were carried out by the Ministry of Health's vertical programs, such as smallpox, tuberculosis and yellow fever, others were carried out by the state health departments, such as polio, measles and the triple bacterial vaccine (TEMPORÃO, 2003).

The National Immunization Program is a program of the Brazilian Ministry of Health, created in September 1973 and institutionalized by Decree No. 78.231 of August 12, 1976, with the aim of promoting the control of diseases preventable by immunization, establishing standards and technical parameters for the use of immunobiologicals for states and municipalities. The PNI is also responsible for coordinating and supervising the use of immunobiologicals, as well as participating in the production of immunobiologicals produced in the country (RIBEIRO, 2008).

ANTI-VACCINE MOVEMENT

In 1982, the documentary DPT: Vaccine Roulette was released, which generated much debate and controversy by associating the triple bacterial vaccine with brain damage. In 1998, British doctor Andrew Wakefeld published a study in the renowned scientific journal The Lancet which consisted of analyzing 12 children with autism. Of these, eight showed symptoms of the syndrome two weeks after receiving the MMR. According to the doctor, these children's immune systems went haywire after excessive stimuli. Subsequently, investigations revealed that some of the children analyzed in the study were referred by a law firm that wanted to take action against the pharmaceutical industry. Only in 2010 was the study removed from The Lancet's website and the doctor's license revoked by the British Medical Council. (Revista Médico em Dia - July/ August 2017).

It is possible to see the growth of groups opposed to vaccination. According to representatives of the European Center for Disease Prevention and Control, at the beginning of the year Europe experienced a measles outbreak with more than 1,500 cases recorded in 14 countries, due to the large number of unvaccinated individuals. On the internet, more precisely on social media, there are various groups that openly discuss the issue. Articles are shared (mostly in English) about possible reactions to vaccines and those related to autism. Some of the reasons given for not vaccinating can be philosophical, religious, for fear of adverse reactions and even for medical advice or that of other health professionals. (Revista Médico em Dia - July / August 2017).

In Brasilia, this movement also has followers. Federal civil servant Joana Alves (fictitious name), 33, is married, a mother of four and pregnant. She became a non-vaccination supporter when she was warned by a friend about the link between Guillain-Barré Syndrome (a disease in which the immune system attacks the nerves) and the HPV vaccine. After searching various websites, she discovered the book The Medical Malpractice, by Ghislaine Lanctôt, a former doctor (after the book was published she had her registration revoked). "I identified with this behavior of not vaccinating my children and myself. My eldest son is nine years old, he's had a few vaccinations, but we've decided not to vaccinate him anymore, as well as our youngest, who is two years old. I believe that by not having the vaccine we will be healthier, we will have greater immunity and we will be free from the risks of the heavy metals contained in the vaccines," she said. She has also decided that her unborn child will not be vaccinated (Revista Médico em Dia - July / August 2017).

VACCINE CONTROVERSIES

August 2014. In the town of El Carmen de Bolívar, Colombia, 276 teenage girls from the same school take the vaccine against the human papillomatosis virus (HPV), the main cause of cervical cancer, and fall ill. Some fainted, others had headaches and dizziness, as well as tingling and numbness in various parts of their bodies. Taken to hospital, the girls undergo tests, but no clinical cause is found to justify the symptoms. In view of the situation, the Colombian health authorities issued a diagnosis: what affected the girls was a mass psychogenic reaction, a psychological disorder in which members of a group show the same symptoms simultaneously and which usually affects children and adolescents under physical and emotional stress.

Bertioga, on the coast of São Paulo, September 2014. Eleven girls from the same school receive the second dose of the HPV vaccine and feel unwell. Three of them have numbness in their legs and are hospitalized. However, as their tests reveal no neurological problems and they recover well, they are discharged. It is not known whether or not these reactions can be attributed to the vaccine. The health authorities in the state of São Paulo are working on the hypothesis of a psychogenic reaction and are not suspending the use of the vaccine batch.

Events involving possible adverse reactions to vaccines, such as those involving the girls from El Carmen de Bolívar and Bertioga, arouse suspicion and are the main sources of controversy surrounding immunization programs. The fear that episodes of this nature give rise to is the idea that vaccines, instead of fulfilling their original function of strengthening the immune system and preventing disease, are capable of causing serious damage to health. HPV vaccination has proved to be one such case.

Data from the Ministry of Health's Department of Communicable Disease Surveillance shows that among the 145,000 girls aged 11 to 13 vaccinated in Rio Grande do Sul, there were only six reported cases of adverse reactions, five in Porto Alegre, with malaise, muscle pain, headache and nausea, and one in Veranópolis, with a seizure (it is not known whether or not this reaction can be attributed to the vaccine). They had all received vaccines from the same batch, the use of which had been preventively suspended. Muscle pain, headache and nausea are relatively common symptoms of adverse reactions to vaccination - 1% or more are expected with the quadrivalent.

According to an article by Nicola Klein, a medical researcher at the Kaiser Permanente Vaccine Study Center, and collaborators, the quadrivalent vaccine increases the possibility of fainting on the same day as vaccination (23 cases among 189,629 women aged 9 to 26 in California, United States) and of skin infection two weeks after vaccination (24 cases), but is otherwise safe and is not associated with any other medical condition, not even epileptic episodes and seizures.

SECTICISM

A minority group of health professionals believe that the cost-benefit ratio is not worth it - that there would be a greater gain if the money used to purchase and administer HPV vaccines were used for other strategies, such as strengthening the supply of Pap smears. For Gustavo Gusso, PhD in clinical medicine from USP and professor of general practice at the same university, "the main problem is in fact the use of substitute outcomes and the lack of consistent benefits for the most relevant outcomes". In an article on February 2 this year in Folha de S. Paulo, Gusso pointed out his skepticism about the vaccine's effectiveness: "Cervical cancer kills, but the vaccine has

so far not shown that it will prevent these deaths. It prevents warts and lesions on the cervix, which don't kill. The absolute majority of them regress." The quadrivalent vaccine (against subtypes 6, 11, 16 and 18 - not to be confused with the tetravalent bacterial vaccine, used to prevent diphtheria, tetanus, pertussis and bacterial meningitis) was only licensed in 2006 and the bivalent vaccine (against subtypes 16 and 18) in 2007. But the development cycle between HPV infection and the transformation of epithelial cells into a tumor can take more than 20 years; however, over about 10 years of follow-up, the vaccines have been shown to be effective in preventing the development of precancerous lesions associated with HPV, which has led the WHO to recommend vaccination in cases where cervical cancer is a public health priority, there is technical and economic feasibility in the country to offer the vaccines and the cost-benefit ratio has been adequately considered.

In an article reviewing the scientific literature on HPV vaccines, Alessandra Borsatto, a nurse at the National Cancer Institute (Inca), and collaborators consider that there are still gaps to be clarified before vaccination is adopted on a large scale, such as a more detailed study on the prevalence of serotypes in Brazil. However, for a cost-effectiveness analysis, the authors adopted a dose price of US$ 100, charged in private clinics - in the government purchase, the initial price was around R$ 30 a dose (around US$ 13).

In the WHO's assessment, the overall quality of the scientific evidence supporting the efficacy of HPV vaccines administered to adolescent girls in preventing the subsequent development of cervical cancer is considered moderate, i.e. new research is likely to have an important impact on the degree of confidence in the estimate of the effect and may alter this estimate.

HISTORIC REJECTION

The controversies surrounding vaccines are as old as their creation. In the West, opposition to the idea of inoculating an infectious agent into a healthy organism has been recorded since the end of the 18th century, when the first vaccine was developed, created by the doctor Edward Jenner, began to be used widely in England to prevent smallpox. Criticism came from various sectors of society. While parents rejected the proposal to use lymph infected with the bovine version of the smallpox virus to try to protect their children's health, the Church claimed that, due to its animal origin, Jenner's vaccine was "not Christian". But the focus of the social tension that the issue was already arousing was the compulsory nature of vaccination, which, according to English citizens of the time, was an attack on individual freedoms.

As tensions grew and laws were passed (in 1853 and 1857) making it compulsory to vaccinate children, with penalties for parents who failed to do so, anti-vaccination leagues soon sprang up in England. The debate about vaccines became so heated that, in 1885, between 80,000 and 100,000 people marched against vaccination through the streets of Leicester, carrying a child's coffin and a portrait of Jenner. The demonstrations led the English authorities to back down, withdrawing the penalties provided for in the vaccination law and instituting the possibility of exemption for parents who did not want to vaccinate their children.

In the United States, at the beginning of the 20th century, smallpox vaccination campaigns also generated discontent, which resulted in the founding of three anti-vaccine leagues. During this period, many American citizens even brought individual lawsuits against the state in an attempt to assert their right not to be vaccinated. "In countries where individual autonomy is more respected and respected, the natural and universal rejection of vaccina-

tion has emerged more strongly," says doctor Paulo Roberto Vanconcellos-Silva, a researcher at the Oswaldo Cruz Foundation (Fiocruz) and professor of bioethics at the Federal University of Rio de Janeiro (UFRJ). Even in Brazil - where, according to the researcher, a "culture of subservience in relation to state health actions" still prevails today - at the beginning of the 20th century, the population organized itself to create an anti-vaccine league. In 1904, they even took up arms to fight against compulsory vaccination. The conflict, which left a total of 945 detainees - 461 of whom were deported to Acre to work in rubber extraction - 110 wounded and 30 dead in less than two weeks, was based on social and political tensions and became known as the "Vaccine Revolt".

CHAPTER 2

THE RELATIONSHIP BETWEEN THE BENEFICIAL AND HARMFUL EFFECTS OF VACCINES IN THE WORLD OF HEALTH

The smallpox vaccine was developed over two hundred years ago by Edward Jenner[1] . It wasn't until almost a century later (1885) that Louis Pasteur developed a new product against rabies and called it a vaccine, in honor of Jenner.

From the end of the 19th century to the middle of the 20th century, several vaccines were developed, based on inactivated vaccine antigens, proteins, polysaccharides and attenuated microbial agents. In the early 1960s, with the development of *in vitro* cell culture technology, several viral vaccines were developed, including inactivated (Salk) and attenuated (Sabin) polio, measles, rubella and mumps vaccines[2,3] . Vaccine formulations have also been improved, with combined forms such as the bacterial triple (diphtheria, tetanus, pertussis), viral triple (measles, mumps, rubella), pentavalent (DTP, hepatitis B and *Haemophillus influenzae* type b), and heptavalent formulations are emerging. The old multi-dose vaccine presentations of 200, 100, 50 and 20 doses are being abandoned, giving way to presentations with fewer doses, with the aim of offering greater vaccine safety through less handling and less waste in the vaccination operation. There is currently a worldwide trend towards single-dose presentations, especially for high value-added vaccines. With the new vaccines, vaccination activities are being strengthened and technological innovation is receiving rapid impetus worldwide.

Update on the global vaccination situation

A major global effort is being made to strengthen vaccination programs, especially in developing countries, seeking greater coverage of traditional vaccines and the introduction of new vaccines into vaccination programs. According to the World Health Organization (WHO), the United Nations Children's Fund (UNICEF) and the World Bank, from 2000 to 2007, measles vaccination campaigns reduced deaths by 74%. Of the six WHO regions, polio has been eliminated in three regions; in 1988, it was endemic in 125 countries, and today only four countries have endemic polio. The three-dose DTP vaccination reached 80% coverage in 2007.

The traditional institutions with a global role in vaccinations are UNICEF and WHO[6] . The former is responsible for developing global demand forecasts and carries out international tenders for large volumes, thus obtaining the lowest international prices. The WHO coordinates global vaccination programs, some of which are specific, such as polio eradication, scheduled to take place by 2015; measles eradication, as well as coordinating the world's vaccination programs through its regional offices.

In 2009, the WHO played its key role as global coordinator of vaccine and immunization issues in the development and rapid production of the H1N1 vaccine. Thanks to the action of strong coordination, bringing together public and private institutions and experts in the field, it was possible to develop a vaccine against the H1N1 virus in a relatively short period of seven months from the first notification of the disease in Mexico on April 22, 2009, to the first vaccine registered in November 2009.

In recent years, new players have been developing important activities in this area. These are non-governmental institutions playing a highly relevant role in increasing global vaccination, with awareness-raising and advocacy work with governments and politicians, in advocacy and convincing activities and also with representative and specialized entities and professionals in the field. Some of these organizations have funds and collaborate in the implementation of various projects for technological innovation in vaccines and operational procedures, as well as seeking alternative ways of raising financial resources, organizing and structuring vaccination programs in less developed countries. Some of the most important organizations are mentioned below.

GAVI (Global Alliance) was created in 2000 under the name Global Alliance for Vaccine and Immunization, in a coalition of WHO, UNICEF and the World Bank, with funding from the Bill and Melinda Gates Foundation (BMGF) and several Nordic countries. Its headquarters are in Geneva. It has the following objectives:

- Strengthen the vaccination programs of the 72 poorest countries in the world;
- Accelerate the introduction of new vaccines and access to existing underused ones;
- Strengthen health and vaccination systems in the countries;
- Introducing innovative immunization technologies.

With the implementation of the proposed goals, millions of child deaths are being prevented, especially in the 72 selected countries, which will certainly contribute to the achievement of the Millennium Development Goals for child health - a two-thirds reduction in the number of under-five deaths by 2015.

The vaccination program of the Pan American Health Organization/World Health Organization (PAHO/WHO) seeks consensus among the countries of the region of the Americas on technical, methodological and political issues. It also manages the Vaccine Revolving Fund, which meets the vaccine demands of the countries in the region of the Americas through international bidding for large volumes, thus obtaining lower prices on the international market. In September 2006, PAHO/WHO created the Provac Institute[15] , with the aim of developing economic and epidemiological situation analysis to help countries make evidence-based decisions when a new vaccine is introduced into the basic calendar.

The results of the PAHO/WHO vaccination strategy are excellent, achieving high levels of vaccination coverage and great impact, as in the case of the elimination of polio, measles and rubella, while also achieving a substantial reduction in the notification of cases of other vaccine-preventable diseases.

Immunization, particularly in the under-five age group, is an important way of preventing infectious diseases which, in the recent past, led to the death and serious sequelae of thousands of children in Brazil and around the world.

A vaccine can be defined as exposure by injection, ingestion or inhalation of a non-toxic product, which stimulates the individual to produce antibodies. If the same individual is re-exposed to the pathogen they were

vaccinated against, the re-exposure will result in a secondary response, which includes the proliferation of B cells and the formation of antibodies, protecting the individual from developing the disease.

Vaccination is linked to proposals to reduce child mortality. Worldwide, there are approximately 11 million deaths of children under the age of five every year, around four million of them in the first month of life; a large proportion of these deaths could be avoided if all children were covered by existing interventions. Vaccinating children in the first year of life is essential for the prevention of various communicable diseases. Identifying vaccination coverage and the factors responsible for delayed or missed immunizations is essential for properly monitoring vaccination programs and for identifying and reaching unvaccinated children.

In a narrative review that considered information contained in the bibliographic databases NCBI-PubMed, Medline, Lilacs and Scientific Electronic Library Online (SciELO), between November 2015 and November 2016. Published in Scielo revelo:

The risks associated with the use of available vaccines do not justify discontinuing any formulation available on the market. On the other hand, the risk associated with "non--vaccination" is causing growing concern in several countries. Advertising campaigns, disseminated on social media or even coated in supposedly "scientific" evidence, contribute to the resurgence of diseases that were once eradicated in much of the world. In Brazil in particular, the lack of information and the dissemination of unqualified information are contributing to the reappearance of infectious diseases such as measles and whooping cough. Also noteworthy is the risk associated with non-acceptance of vaccines, such as those involving vaccines that prevent HPV infection, whose expected impact on mortality should only occur if adequate conditions of vaccine administration and coverage are maintained. The role of health professionals in publicizing the benefits associated with vaccination is one of the most important in ensuring health and quality of life for the population. (Rev Saude Publica).

The great advance of vaccination programs around the world, achieving high coverage with traditional vaccines and in some countries with the introduction of new high value-added vaccines, has saved the lives of thousands of children from vaccine-preventable diseases, making it possible to achieve the Millennium Development Goals. The role played by some multilateral institutions such as WHO, UNICEF, PAHO; and non-governmental institutions such as GAVI, with financial support from the BMGF, has made the globalization of vaccinations possible, including the introduction of new vaccines in the world's poorest countries. However, the sustainability and continuation of vaccination programs in these countries remains unresolved. Possibly, government authorities and society as a whole in these countries will have to become more aware of the importance of vaccination in order to gradually increase the budget dedicated to these activities.

The big multinational laboratories are investing heavily in technological innovation for new vaccines, which will make it possible to launch important new vaccines with high added value. It will be very important for the Brazilian government to reinforce investments in technological innovation and maintain the policy of introducing new vaccines, with the incorporation of the respective production technology by national laboratories, in such a way as to make it possible to maintain technological capacity and the production of these strategic inputs for Public Health in the country. (Homma 2010)

CHAPTER 3

HEALTH CONSEQUENCES OF THE ANTI-VACCINE MOVEMENT

The anti-vaccine movement is an idea that is growing worldwide, especially in Europe and North America. Proof of this is the measles outbreak that occurred in Italy in August this year, with more than 4,000 cases. The disease, which killed more than 2 million children a year worldwide in the 1990s, was eradicated in Brazil in 2001. In 2016, we received the certificate of elimination, as well as rubella, from PAHO (Pan American Health Organization). Here, the movement is still weak, but it is starting to gain followers. (*Thais Carvalho Diniz, 2017)*

Virologist Marilda Siqueira, head of the Respiratory Virus and Measles Laboratory at Fiocruz (Oswaldo Cruz Foundation), says that initially people who talk about not vaccinating think only of their own home, of the child who hasn't been vaccinated, but the consequences can be serious.

"In 2016, there was an occasional decrease, but we can't say it's a trend. That can only be said after a drop of three or four consecutive years. I believe it may also have been due to the economic crisis, which interferes with families' access to health clinics at specific times, for example," says Carla Domingues, coordinator of the Ministry of Health's National Immunization Program.

MEASLES OUTBREAK IN THE METROPOLITAN REGION OF CAMPINAS, SPAIN

Brazil has had no endemic circulation of the measles virus since 2000. Between May and June 2011, the Metropolitan Region of Campinas, in the state of São Paulo, recorded three cases of measles. Cases, control measures, the search for possible sources and secondary cases were described. Genotypic characterization of the virus identified the D4 genotype, circulating on the European continent. No index or secondary cases were found. The control measures carried out, together with adequate vaccination coverage in the Campinas Metropolitan Region, have contributed to interrupting the transmission of the disease.

Case 1, male, seven years old, resident in Americana and student in the municipality of Nova Odessa, notified on 20/5/2011. Onset of symptoms on 7/5/2011 and rash on 10/5/2011.

Case 2, female, 42 years old, mother of case 1, teacher at her son's school, onset of symptoms on 18/5/201 and rash on 21/5/2011.

Case 3, male, 21 years old, resident in Nova Odessa, student in Santa Bárbara D'Oeste and working in Sumaré. Onset of symptoms on 3/5/2011 and rash on 8/5/2011.

Cases 1 and 2 had no documented vaccinations, due to the family's choice of alternative medicine. Case 3 had a vaccination card with two doses of measles vaccines, administered at nine and 15 months. He reported a history of acute lymphoid leukemia and chemotherapy at the age of six.

The three cases denied a history of international travel or contact with people who had recently traveled abroad.

All of them had a maculo-papular rash, accompanied by a runny nose; two cases had a dry cough and fever. One reported malaise, sore throat and conjunctivitis. None of them had complications or were hospitalized. All progressed to cure without sequelae.

Laboratory confirmation of measles was achieved by detecting IgM antibodies in an enzyme-linked immunosorbent assay and IgG seroconversion in paired serum samples. It was possible to identify the D4 genotype virus in the clinical samples of cases 1 and 2.

MEASLES EPIDEMIOLOGY SITUATION

In 2016, Brazil was certified by the Pan American Health Organization (PAHO) as having eliminated the circulation of the measles virus, and is currently making efforts to maintain the certificate, mainly by strengthening epidemiological surveillance, the laboratory network and immunization strategies.

Between 2013 and 2015, there were outbreaks caused by patients coming from other countries, with 1,310 cases of the disease recorded during this period. The highest number of cases was recorded in the states of Pernambuco and Ceará.

In the measles outbreaks that occurred in Ceará and Pernambuco between 2013 and 2015, the blockade actions carried out by the Ministry of Health - in conjunction with the states and municipalities - were efficient and resulted in the interruption of the transmission of the disease. In 2017, measles cases in Venezuelans who entered the state of Roraima were confirmed, causing an outbreak of the disease in the state, with cases spreading to Manaus. The Ministry of Health continues to monitor the measles situation throughout the country, especially in Roraima and Amazonas, and control and prevention measures are already being carried out.

The National Immunization Program sets a target of 95% vaccination coverage in all municipalities. In order to assess and monitor this coverage, Rapid Coverage Monitoring (CRM) must be carried out systematically, with coordination between the epidemiological surveillance and immunization teams, the Community Health Agents Program (PACS) and the Family Health Strategy (ESF).

PERTUSSIS ILLNESS AND NUMBER OF DOSES OF PERTUSSIS VACCINES ADMINISTERED

Pertussis is an acute infectious disease that is highly transmissible and an important cause of morbidity and mortality in children. Its etiological agent is the bacterium Bordetella pertussis, and man is its only natural reservoir. The disease is immune-preventable and there are two types of pertussis vaccine: the vaccine based on dead B. pertussis organisms (whole cell vaccine); and the acellular vaccine, based on highly purified B. pertussis components. Both vaccines have excellent safety records; however, due to its reactogenicity, the whole-cell vaccine is recommended for children under seven years of age. The immunity conferred by the vaccine is long-lasting but not permanent, decreasing over time until its protection is greatly reduced, or none at all: this happens, on average, between 5 and 10 years after the last dose administered. In Brazil, pertussis is a notifiable disease. Data on the notification and investigation of this disease is stored in the Notifiable Diseases Information System (SINAN). To prevent pertussis, the National Immunization Program (PNI) has offered the Pertussis vaccine since its creation in 1973.

Between 2007 and 2011, 17,830 suspected cases of pertussis were reported, 5,921 (33.2%) were confirmed and 901 (5.1%) were classified as inconclusive, i.e. automatically closed by the information system after 60 days from the date of notification. Most of the confirmed cases occurred in children under four months of age, although the number of pertussis cases in the over-seven age group has also been significant. Despite the decrease in cases observed between 2008 and 2010, there was an increase in the number of cases in the following year, 2011 he present study revealed that an incomplete vaccination schedule with administered Pertussis vaccines was associated with a greater chance of pertussis

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occurring after 6 months of age, when children are expected to have completed the vaccination schedule for the disease. Pertussis cases among older children and adolescents have become increasingly frequent, and the adoption of complete immunization schedules, including boosters, increases the time of immunity provided by the vaccine, which is not permanent.10 Although the subject has been little studied, a study carried out in the United States of America found that the whole-cell Pertussis vaccine provided an efficacy of around 44% with one dose, increasing to 80% with four doses,11 a finding that ratifies the need for complete vaccination schedules for immunization against pertussis.

EPIDEMIOLOGICAL SITUATION OF PERTUSSIS

Pertussis morbidity in the country was once high. In the early 1980s, more than 40,000 cases were reported annually and the incidence rate was over 30/100,000 inhabitants

In mid-2011, there was a sudden increase in the number of cases of the disease in the country. Several hypotheses have been put forward to explain this increase, such as: greater sensitivity of care and surveillance in the diagnosis and notification of cases, improved laboratory diagnosis with the introduction of biomolecular techniques, heterogeneous vaccination coverage, greater susceptibility of individuals under the age of 6 months who have not received the full vaccination schedule, as well as the cyclicality of the disease itself, which occurs at intervals of three to five years, with an expected increase in the number of cases. According to data recorded in the Notifiable Diseases Information System (SINAN), 22,772 cases of pertussis were confirmed nationwide between 2011 and 2014. In 2015, 2016 and 2017, 3,110, 1,333 and 1,893 cases of pertussis were confirmed, respectively.

EPIDEMIOLOGY OF DIPHTHERIA

Since the 1990s, Brazil has seen a significant reduction in the incidence of cases, thanks to increased vaccination coverage. In that decade, the incidence reached 0.45/100,000 inhabitants, decreasing as coverage increased. Between 2008 and 2017, there were 10 deaths from the disease, 3 of which in 2010. In 2017 there was one death from a case imported from Venezuela. The expected lethality varies between 5 and 10%, reaching 20% in certain situations. Vaccination coverage with DTP has been rising over this period, from 66% in 1990 to over 95% in 2015. In 2016 and 2017, coverage was 92% and 78% respectively

EPIDEMIOLOGICAL SITUATION OF RUBEOLA

In Brazil, rubella was only included in the list of notifiable diseases in the second half of the 1990s. In 1997, the year in which the country faced its last measles epidemic, around 30,000 cases of rubella were reported, with outbreaks occurring in several states between 1999 and 2001. During this period, there was a progressive increase in the number of suspected CRS cases (from 200 to 600), which reflected both the increase in the circulation of the virus, with incidences of 5/100,000 women in the 15-19 age group and 6.3/100,000 women in the 20-29 age group for rubella (in 2001), and the increase in surveillance strategies for detecting cases. Thus, epidemiological surveillance of these diseases has proved to be sensitive, timely and specific.

The implementation of the Measles Eradication Plan in the country, starting in 1999, boosted the surveillance and control of Rubella. In 2002, there were 1,480 cases in Brazil, which corresponds to a decrease of 95% when compared to the incidence in 1997. That year, the incidence rates for females were 1/100,000, both in the 15-19 and 20-29 age groups. Between 2000 and 2002, 37,663 cases

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of rubella were confirmed. In 2005, there was an outbreak of rubella in the state of Rio Grande do Sul, with 44 confirmed cases and the identification of genotype 1D, the same as that circulating in Europe. In 2006 and 2007, there were large increases in the number of confirmed cases and outbreaks in the states of Rio de Janeiro, Minas Gerais, Ceará and São Paulo, with genotype 2B, with this year's increase being 80% (6,692/8342), and of these 77% (6,640/8342) were confirmed by laboratory criteria.

With the intensification of epidemiological surveillance and expanded block vaccination in 2008, the number of cases fell by 273.6% (6109/8342) compared to 2007. That year, 84% (1868/2233) of the cases were closed by laboratory criteria.

In Brazil, the last confirmed case of rubella occurred in December 2008 in the state of São Paulo. From January 2012 to December 2015, 16,739 cases of rubella were reported, all of which were closed by laboratory criteria or epidemiological link.

It should be noted that in the Rubella Vaccination Campaign held in 2008, around 67.9 million men and women aged between 20 and 39 were vaccinated, including people aged between 12 and 19 in the states of Rio de Janeiro, Minas Gerais, Rio Grande do Norte, Mato Grosso do Sul and Maranhão, as mentioned above. This represented 96.7% of the target public for vaccination.

The age groups for the Rubella Vaccination Campaign in 2008 were defined following a cohort study of live births between 1927 and 2007 to identify the unvaccinated population. Also noteworthy was a mass vaccination campaign aimed at women of childbearing age between 2001 and 2002. During this period, the double viral (measles and rubella) and triple viral vaccines were introduced into the PNI's Basic Vaccination Calendar, a process that began in 1992.

In 2014, an imported case of rubella was confirmed in the state of Rio de Janeiro. A 28-year-old male crew member from the Philippines, unvaccinated, presented with a rash on October 1, 2014. He was hospitalized and notified by the private system as suspected of having measles. In the differential diagnosis, IgM serology was reactive for rubella and genotype 2B was identified. The epidemiological surveillance team carried out the investigation looking for symptomatic cases among the 103 crew members and administered 89 doses of triple viral vaccine in the vaccination blockade. No secondary cases were identified.

On April 23, 2015, Brazil received the document verifying the elimination of Rubella and Congenital Rubella Syndrome from the International Committee of Experts.

On September 27, 2016, the country received the Measles elimination verification document from the International Committee of Experts.

EPIDEMIOLOGICAL SITUATION OF POLIOMYELITIS

Until the first half of the 1980s, poliomyelitis had a high incidence in Brazil, contributing significantly to the high annual prevalence of physical sequelae observed during that period. In 1994, the Pan American Health Organization/WHO certified the elimination of autochthonous transmission of wild poliovirus in the Americas, after 3 years without circulation of this virus on the continent. Since then, all the countries in the region have undertaken to maintain high and homogeneous vaccination coverage, as well as active and sensitive epidemiological surveillance to immediately identify the reintroduction of wild poliovirus in each national territory and adopt control measures capable of preventing its spread.

In Brazil, the last case of wild poliovirus infection occurred in 1989, in the city of

Souza/PB. The strategy adopted to eliminate the virus in the country was centered on mass vaccination campaigns with the oral polio vaccine (OPV). This vaccine provides individual immunity and increases group immunity in the general population, with the vaccine poliovirus spreading in the environment in a short space of time.

Two factors were decisive for certification as a country free of autochthonous circulation of wild poliovirus: high levels of vaccination coverage obtained in national campaigns, starting in 1988, and an increase in the immunogenic power of the vaccine used in the country, due to the substitution of the P3 component previously used. It can be seen that, after Certification in the Americas, there was a reduction in the sensitivity of the Epidemiological Surveillance System, which was only recovered from the year 2000 onwards, as a result of an intense institutional effort to improve polio surveillance in the federal units.

Attention is drawn to the risk of importing cases from countries where there is still endemic circulation of wild poliovirus (Pakistan and Afghanistan). This reinforces the need to maintain permanent and effective disease surveillance actions and adequate levels of immunological protection for the population.

The first outbreak caused by a vaccine-derived virus (PVDV) was detected on the island of Hispaniola (which belongs to Haiti and the Dominican Republic) in 2000/2001. This outbreak was of great importance in the process of eradicating Polio, when 21 cases were recorded (50% in the 1-4 age group).

Attention is drawn to the occurrence of cases of vaccine-derived polio in countries with insufficient and/or heterogeneous vaccination coverage. In other words, the vaccine-derived virus starts to regain neurovirulence and pathogenicity, causing outbreaks of polio in countries that already had the disease under partial or total control. From 2004 to 2017, outbreaks occurred in 23 countries (Mozambique, Miamar, Indonesia, China, Pakistan, Nigeria, Cameroon, Niger, Chad, Afghanistan, Somalia, Kenya, Congo, Yemen, India, Ethiopia, Madagascar, Laos, Ukraine, Syria, Guinea, Sudan and Cambodia).

It should be noted that the control of the circulation of vaccine-derived poliovirus is the same as that developed for wild poliovirus: achieving and maintaining high and homogeneous vaccination coverage.

The absence of wild poliovirus circulation in Brazil is monitored through surveillance of Acute Flaccid Paralysis (AFP/Polio). Every case of AFP in children under fifteen, regardless of the diagnostic hypothesis, must be notified, investigated immediately, entered into the Notifiable Diseases Information System (SINAN), have a stool sample collected by the 14th day after the onset of motor deficit for viral isolation and diagnostic clarification, have a neuromuscular reassessment carried out (revisit) to assess neurological sequelae 60 days after the onset of motor disability, and be closed in the system within 60 days of notification.

EPIDEMIOLOGY OF TETANUS

Accidental tetanus is a universal disease that can affect men, women and children regardless of age, when susceptible. It is more common in developing and underdeveloped countries. The lethality of the disease is high: of every 100 people who fall ill, around 30 die. Tetanus is a rare disease in European and North American countries, mainly as a result of social/educational development and vaccination. In Brazil, there has been a steady reduction in accidental tetanus. In 1982, 2,226 cases were confirmed, with an incidence rate of 1.8 cases per 100,000 inhabitants. In 1992 there were 1,312 cases with an incidence of 0.88, a reduction of 58%. In 2002 there were 608 cases with an incidence of 0.35, a

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reduction of 53% compared to the previous decade. Since 2007, the average number of confirmed cases has been around 340 cases/year, with an incidence of 0.18.

Between 2013 and 2017, 1,313 cases of accidental tetanus were recorded in the country: 188 in the North (14.3%); 382 in the Northeast (29.1%); 307 in the Southeast (23.4%); 266 in the South (20.3%) and 170 in the Midwest (12.9%). The incidence rate varied from 0.14 in 2013 to 0.11 per 100,000 inhabitants in 2017. In the same period, 70% of cases were concentrated in the 30-69 age group. The majority of accidental tetanus cases occurred in the categories of pensioners, agricultural workers, followed by construction workers (bricklayers), students and housewives. Another characteristic of the epidemiological situation of accidental tetanus in Brazil is that, since the 1990s, there has been an increase in the occurrence of cases in urban areas. This change can be attributed to the rural exodus. Lethality remains above 30%, and is more representative of the elderly.

In 2016 and 2017, 243 and 230 cases were confirmed nationwide. Lethality in the same period was 33% and 28% respectively, which is considered high when compared to developed countries, where it is between 10 and 17%.

YELLOW FEVER EPIDEMIOLOGICAL SITUATION

Since July 2014, the Yellow Fever (YF) virus has re-emerged in Brazil. Epizootics in non-human primates (NHP) confirmed for YF have been recorded since then, partly associated with the occurrence of human cases. In the 2014/2015 monitoring period (July/2014 to June/2015) seven human cases of the disease were confirmed (Goiás [5], Pará [1] Mato Grosso do Sul [1]) and four epizootics in NHPs (Tocantins [2], Goiás [1], Pará [1]).

Recently, during the resumption of monitoring for the 2015/2016 period (which began in July/2015), other epizootic diseases in NHP were confirmed in Tocantins (Porto Nacional [1] and Palmas [1]), Goiás (Novo Brasil [1]) and the Federal District (Administrative Regions of Ceilândia [1] and Candangolândia [1]), showing the intense activity of the yellow virus in the country, especially in the Midwest region.

EPIDEMIOLOGICAL SITUATION OF VARICELLA

Between 2012 and 2017, 602,136 cases of chickenpox were reported in Brazil, with the southern region reporting the highest number with 199,057 (33%) of cases, followed by the southeastern region with 189,249 (31.4%), while the northern region reported only 40,325 (6.6%). From 2012 to 2017, 38,612 hospitalizations for chickenpox were recorded in Brazil, the highest number occurring in 2013 with 9,553 (24.7%) and in 2017 only 1,793 (4.6%) hospitalizations until June 2017, with an average of 6,435 cases.

PRESENTATION OF RESULTS.

A total of 20 articles covering the main topic were selected, which were published between 2007 and 2018, in Portuguese, including articles published on the Ministry of Health's website. During the preparation of the work, multiple publications were found and among them those with the greatest renown and updating were chosen.

After an in-depth analysis of each of the articles presented, in an attempt to answer the objectives of the study, the following results were obtained

- Variolization spread rapidly in England and had illustrious advocates in other countries, such as Von Haller in Germany, Voltaire in France, and Benjamin Franklin in the United States (Ujvari, 2003, pp. 130-134).

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NO.	AUTHOR	TITLE	PUBLICATION	YEAR
1	MIGOWSKI, E	Vaccines	BBS Publishing	2007
2	Figueiredo GLA	Families' experiences of vaccinating children under the age of two	University of São Paulo	2007
3	VJS Fields	History of vaccination in Brazil	Scielo	2009
4	REZENDE, JM.	In the shade of the plane tree: chronicles of medical history	SciELO Books	2009
5	VANNI, SC	Immunization: history of vaccination in Brazil	webarticles	2009
6	HOMMA, Akira;	Update on vaccines, immunizations and technological innovation. Bio-Manguinhos Institute of Immunobiological Technology	SciELO Books	2010
7	Pugliesi MV	Mothers and child vaccination: a study of social representations in a public health service	Rev. Bras. Matern. Infant.	2010
8	FERNANDES, Eder Gatti et al	Measles outbreak in the Campinas metropolitan region	Rev. Public Health	2013
9	WILLEMANN, Maria Cristina Antunes et al	Pertussis illness and number of doses of Pertussis vaccines administered	Epidemiol. Serv. Health	2014
10	TAKATA, Roberto; GIRARDI, Alice	Controversies surrounding vaccines	ComScience	2014
11	AMBR. Magazine	Doctor up to date N173	AMBR. Magazine	2017
12	CARVALHO DT.	Anti-vaccine movements: how they came about and what consequences they can have	Brazilian Society of Pediatrics	2017
13	After LRMM, Piantola MAF	Vaccine adverse events and the consequences of non-vaccination	Rev Saude Publica	2018
14	Ministry of Health	Measles Epidemiology Situation	Portalms	2018
15	Ministry of Health	Situation Epidemiology pertussis	Portalms	2018
16	Ministry of Health	Status Epidemiology Diphtheria	Portalms	2018
17	Ministry of Health	Situation Epidemiology Rubeola	Portalms	2018
18	Ministry of Health	Situation Epidemiology tetanus	Portalms	2018
19	Ministry of Health	Situation Epidemiology F.A.	Portalms	2018
20	Ministry of Health	Epidemiology Varicella	Portalms	2018

Table 1 below shows the articles reviewed:

• Smallpox was the first infectious disease to be wiped off the face of the earth by preventive vaccination. The history of the anti-varicella vaccine deserves to be remembered for the magnitude of the victory achieved and for the hope that the method has brought us in terms of eradicating other infectious diseases. Until the end of the 18th century, smallpox was a real human scourge, claiming lives or disfiguring the faces of survivors with indelible scars and loss of sight. It is estimated that in the 18th century there were sixty million victims of smallpox in Europe alone (Ministry of Health, 2004).

• In 1982, the documentary DPT: Vaccine Roulette was released, which generated much debate and controversy by associating the triple bacterial vaccine with brain damage. In 1998, British doctor Andrew Wakefeld published a study in the renowned scientific journal The Lancet which consisted of analyzing 12 children with autism. Of these, eight showed symptoms of the syndrome two weeks after receiving the triple virus. According to the doctor, these children's immune systems went haywire after excessive stimuli. Subsequently, investigations revealed that some of the children analyzed in the study were

referred by a law firm that wanted to take action against the pharmaceutical industry. Only in 2010 was the study removed from The Lancet's website and the doctor's license revoked by the British Medical Council. (Revista Médico em Dia - July / August 2017).

- On the internet, more precisely on social media, there are various groups that openly discuss the issue. Articles are shared (mostly in English) about possible reactions to vaccines and those related to autism. Some of the reasons given for not vaccinating can be philosophical, religious, for fear of adverse reactions and even for medical advice or that of other health professionals. (Revista Médico em Dia - July / August 2017).
- The smallpox vaccine was developed over two hundred years ago by Edward Jenner. It wasn't until almost a century later (1885) that Louis Pasteur developed a new product against rabies and called it a vaccine, in honor of Jenner. (Campos VJS)
- Advertising campaigns, disseminated on social media or even coated in supposedly "scientific" evidence, contribute to the resurgence of diseases that were once eradicated in much of the world. In Brazil in particular, the lack of information and the dissemination of unqualified information are contributing to the reappearance of infectious diseases such as measles and whooping cough. Also noteworthy is the risk associated with non-acceptance of vaccines, such as those involving vaccines that prevent HPV infection, whose expected impact on mortality should only occur if adequate conditions of vaccine administration and coverage are maintained. The role of health professionals in publicizing the benefits associated with vaccination is one of the most important in ensuring health and quality of life for the population. (Rev Saude Publica).
- The big multinational laboratories are investing heavily in technological innovation for new vaccines, which will make it possible to launch important new vaccines with high added value. It will be very important for the Brazilian government to reinforce investments in technological innovation and maintain the policy of introducing new vaccines, with the incorporation of the respective production technology by national laboratories, in such a way as to make it possible to maintain technological capacity and the production of these strategic inputs for Public Health in the country. (Homma 2010).
- In 2010, following a court ruling, the article was retracted in its entirety after false information contained in the study and payment agreements involving the researcher and lawyers in vaccine damage compensation lawsuits were discovered. Some studies have also shown that the dose of mercury normally ingested by an individual in food is much higher than the amount present in vaccines. To date, no regulatory body has actually proven the association between these diseases and the preservative (Aps LRMM, 2018).
- The anti-vaccine movement is an idea that is growing worldwide, especially in Europe and North America. Proof of this is the measles outbreak that occurred in Italy in August this year, with more than 4,000 cases. The disease, which killed more than 2 million children a year worldwide in the 1990s, was eradicated in Brazil in 2001. In 2016, we received the certificate of elimination, as well as rubella, from PAHO (Pan American Health Organization). Here, the movement

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is still weak, but it is starting to gain followers. (*Thais Carvalho Diniz, 2017)*

- "In 2016, there was an occasional decrease, but we can't say it's a trend. That can only be said after a drop of three or four consecutive years. I believe it may also have been due to the economic crisis, which interferes with families' access to health clinics at specific times, for example," says Carla Domingues, coordinator of the Ministry of Health's National Immunization Program.
- Brazil has had no endemic circulation of the measles virus since 2000. Between May and June 2011, the Metropolitan Region of Campinas, in the state of São Paulo, recorded three cases of measles. All three cases denied a history of international travel or contact with people who had recently traveled abroad. (FERNANDES, Eder Gatti et al, 2018)
- In 2016, Brazil was certified by the Pan American Health Organization (PAHO) as having eliminated the circulation of the measles virus, and is currently making efforts to maintain the certificate, mainly by strengthening epidemiological surveillance, the laboratory network and immunization strategies. Between 2013 and 2015, there were outbreaks caused by patients coming from other countries, with 1,310 cases of the disease recorded during this period. In the measles outbreaks that occurred in Ceará and Pernambuco between 2013 and 2015, the blocking actions carried out by the Ministry of Health - in conjunction with the states and municipalities - were efficient and resulted in the interruption of the transmission of the disease. In 2017,
- Pertussis is an acute infectious disease that is highly transmissible and an important cause of morbidity and mortality in children. Its etiological agent is the bacterium Bordetella pertussis, and man is its only natural reservoir. The disease is immune-preventable and there are two types of pertussis vaccine: the vaccine based on dead B. pertussis organisms (whole cell vaccine). The morbidity of pertussis in the country was once high. In the early 1980s, more than 40,000 cases were reported annually and the incidence rate was over 30/100,000 inhabitants. In 2015, 2016 and 2017, 3,110, 1,333 and 1,893 cases of pertussis were confirmed, respectively (Ministerio de Saude, 2018).
- In Brazil, rubella was only included in the list of notifiable diseases in the second half of the 1990s. In 2005, there was an outbreak of rubella in the state of Rio Grande do Sul, with 44 confirmed cases and identification of the 1D genotype, the same as that circulating in Europe. On April 23, 2015, Brazil received the document verifying the elimination of rubella and congenital rubella syndrome from the International Committee of Experts (Ministerio de Saude, 2018).
- On September 27, 2016, the country received the document verifying the elimination of measles from the International Committee of Experts (Ministerio de Saude, 2018).
- Until the first half of the 1980s, poliomyelitis had a high incidence in Brazil, contributing significantly to the high annual prevalence of physical sequelae observed during that period. In 1994, the Pan American Health Organization (PAHO) certified the elimination of autochthonous transmission of wild poliovirus in the Americas, after 3 years without circulation of the virus on the continent. In Brazil, the last case of wild poliovirus infection occurred in 1989, in the city of Souza/PB. The strategy adop-

ted to eliminate the virus in the country was centered on mass vaccination campaigns with the oral polio vaccine (OPV) (Ministerio de Saude, 2018).

- Accidental tetanus is a universal disease that can affect men, women and children. Another characteristic of the epidemiological situation of accidental tetanus in Brazil is that, since the 1990s, there has been an increase in the occurrence of cases in urban areas. In 2016 and 2017, 243 and 230 cases were confirmed nationwide. Lethality in the same period was 33% and 28% respectively, which is considered high when compared to developed countries, where it is between 10 and 17% (Ministry of Health, 2018).

With each of the articles presented, we can say that the objectives of the study have been met, with the aim of being able to provide and spread awareness-raising information in order to build a better future for generations to come.

FINAL CONSIDERATIONS

At the beginning of the 21st century, a trend that started in Europe was gaining more and more momentum and ended up influencing much of the world.

This trend, along with other ideologies, has spread throughout the world of globalization and has had major repercussions in the field of public health to this day; repercussions that have gone beyond national borders and put the health of children and adolescents at risk.

Anti-vaccine movements are growing and today we are seeing the fruits of misinformation and disregard for what were once major epidemics. The control of many infectious and contagious diseases is thanks to vaccines. Those diseases that once wiped out the lives of thousands of people all over the world, today due to the growth of medical technology, many of these diseases are only seen in photographs in books or history books. It's important to stop and look back at what was once part of our reality, and because of vaccines is no longer.

This study aimed to record the impacts of the anti-vaccine movement on health in Brazil in 2018. With a study methodology based on a type of bibliographical research with a qualitative theoretical approach, using published scientific studies as a source.

As recorded in the history of vaccines and vaccine-preventable diseases, infectious diseases that killed millions and millions of people in Europe alone, diseases such as Smallpox, Measles, Poliomyelitis and others, which today due to preventive and sanitary measures do not have the same impact on the health of the world's population.

The origin of vaccines and the origin of the anti-vaccine movement are well defined within the framework of history, and you can identify the time and space where they emerged and took hold, as well as the lethality and mortality of what were once these diseases, now compatible and preventable with vaccines.

Variolization, a method used by Eastern peoples over a thousand years ago, consisted of inoculating material taken from the pustules of a sick person onto the skin of a healthy individual, who then acquired the disease in a milder form than through natural contagion. It was the spark that started a great era led by Edward Jenner, the Age of Vaccines, when millions of deaths began to be avoided around the world. This technology spread and today it is a major pillar in the world of health.

The anti-vaccine movement appeared as a questioning of health policies, and gained more strength after the publication of a single study in England, a study carried out by British doctor Andrew Wakefeld in 1998, in the renowned scientific journal The Lancet, which consisted of the analysis of 12 children

with autism. Of these, eight showed symptoms of the syndrome two weeks after receiving the triple virus.

It gained more strength, spreading through the media and reaching various social groups, arriving in Brazil, where it sparked the so-called "Vaccine Revolt" that took place in Rio de Janeiro in 1904, leaving hundreds injured and several dead.

Vaccines were only taken into account as such almost a century after their discovery by E. Jenner, with techniques developed by Louis Pasteur, and from that day on they were called Vaccines. Today, technology has moved on and together with multinational companies, they are now a reality.

The main beneficial attributes of vaccines in the world are clear, and they are being manufactured in huge proportions to be applied mainly to every child in the world, clearly we can appreciate the decrease in mortality and morbidity of children. There are global organizations dedicated to licensing and regulating the vaccine status of each member country.

The harmful attributions include the adverse effects of vaccines, which do not compare with the impact that the disease can have worldwide, and the risks associated with the use of available vaccines do not justify discontinuing the vaccine.

The anti-vaccine movements that were born in the social world cannot be scientifically proven, but this trend is magnified using the most popular media in our environment. Today, Brazil is also experiencing the impact of this trend, and it often gains more territory and supporters.

The epidemiological situation in Brazil is much better than it was 50 years ago and this is ample proof of the need for policies to prevent infectious diseases through vaccines.

Thanks to medical advances in genetic and epidemiological technology, today we can ensure a happy future free from diseases such as smallpox, polio, rubella or others, and it is our duty to continue and give the next generations a better world as a gift.

After carrying out this study, it can be said that the general objective of recording the impacts of the anti-vaccine movement on health in Brazil in 2018 was met; in addition to each of the specific objectives, considering expanding the study in future opportunities.

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