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Health Security on the Brazil–Venezuela Border: vulnerabilities and opportunities*

Seguridad Sanitaria en la Frontera Brasil–Venezuela: vulnerabilidades y oportunidades

Abstract: Emerging infectious disease outbreaks over the past 50 years reinforce the need for bioprotection capabilities at borders. Migrations of vulnerable populations have contributed to the infectious diseases spread, creating threats to the health security of affected nations. The present study investigated aspects of integrated security, bioprotection and agricultural defense on the Brazil–Venezuela border, analyzing some installed capacities and impacts associated with the migratory crisis of Venezuelans and the functioning of Welcome Operation. The research was exploratory and applied, using quantitative and qualitative techniques, with descriptive analysis. Sanitary vulnerabilities were characterized and installed capacities for agricultural defense were mapped. Finally, some strategic actions are indicated to strengthen bioprotection on the northern border and in Welcome Operation, especially greater integration in the field of epidemiological intelligence of the different agencies acting in the health security of the borders.

Keywords: health security; Welcome Operation; migrations and borders; agricultural defense; integrated security.

Resumen: Los brotes de enfermedades infecciosas emergentes en los últimos 50 años refuerzan la necesidad de capacidades de bioprotección en las fronteras. Las migraciones de poblaciones vulnerables han contribuido a la propagación de enfermedades infecciosas, creando amenazas para la seguridad sanitaria de las naciones afectadas. El presente estudio investigó aspectos de la seguridad integrada, bioprotección y defensa sanitaria agropecuaria en la frontera Brasil–Venezuela, analizando algunas capacidades instaladas e impactos asociados a la crisis migratoria de venezolanos y al funcionamiento de la Operación Acogida. Investigación exploratoria del tipo aplicada, utilizó técnicas cuantitativas y cualitativas, con análisis descriptivo. Se caracterizaron las vulnerabilidades sanitarias y se mapearon las capacidades instaladas para la defensa agrícola. Los resultados permitieron señalar algunas acciones estratégicas para fortalecer la bioprotección en la frontera norte y en la Operación Acogida, especialmente la mayor integración en el campo de la inteligencia epidemiológica de las diversas agencias que actúan en la seguridad sanitaria de las fronteras.

Palavras-chave: seguridad sanitaria; Operación Acogida; migracionesy fronteras; defensa agrícola; seguridad integrada.

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1 Introduction

In 2019, the world had 270 million migrants, that is, individuals who do not live in their countries of birth. In absolute terms, the migrant population has increased by almost 120 million since 1990. The number of migrants has remained stable over the past 60 years, about 3% of the world population. The reality of this complex phenomenon has challenged several countries and caused various impacts, mainly economic and in health (IOM, 2020).

Forced migrations due to conflicts and economic/social crises are the most critical, as they involve vulnerable populations[1]. Migrants and refugees due to wars, economic or political crises are often poor and rarely have time to plan their emigration. They tend to travel shorter distances and stay in their home region more often than other migrants. In recent periods, there have been large cumulative refugee flows, increasing the population of host countries by more than 4%. This was the case in Colombia, after the political and economic crisis in Venezuela, and in Jordan and Lebanon, as a consequence of the internal war in Syria (IMF, 2020). In 2020, the destination regions most affected by migration were Europe, with 88 million international migrants, and Asia, with 86 million (MIGRATION DATA PORTAL, 2021).

Migrations of vulnerable populations have been a vector of dispersion of infectious diseases (CASTELLI; SULIS, 2017). This study aimed to map the capacities of sanitary protection and agricultural sanitary defense in the northern border of Brazil and analyze the integrated security and impacts associated with the migration crisis of Venezuelans entering Roraima, since 2014.

The research was exploratory and applied, using quantitative and qualitative techniques, with descriptive analysis. For the open questions of the interviews, the technique of discourse analysis of the collective subject was applied (LEFEVRE; LEFEVRE, 2006).

In 2020, a bibliographic review was carried out on the key themes of the investigation (migrations, health risks, interagency operations, Operation Welcome, agricultural defense, borders, among others) in scientific databases, such as *Google scholar and Scientific Electronic Library Online* – SciELO, institutional repositories, among others.

Documentary research was also conducted in institutional reports and field collection in Boa Vista, Roraima, especially in Operation Welcome. In the field research, carried out in November 2020, visits were made to the shelters of the 5,000 Venezuelans served by the Humanitarian Logistics Task Force in Roraima - Operation Welcome and key actors linked to the health actions of the operation and agricultural defense in the state of Roraima, the Superintendence of the Ministry of Agriculture in Roraima (SFA/MAPA–RR) and the Agricultural Defense Agency of Roraima (ADERR) were interviewed. The collections were authorized by the highest authorities of these institutions and the interviewees signed an Informed Consent Form (ICF). The interviews were recorded and transcribed with the

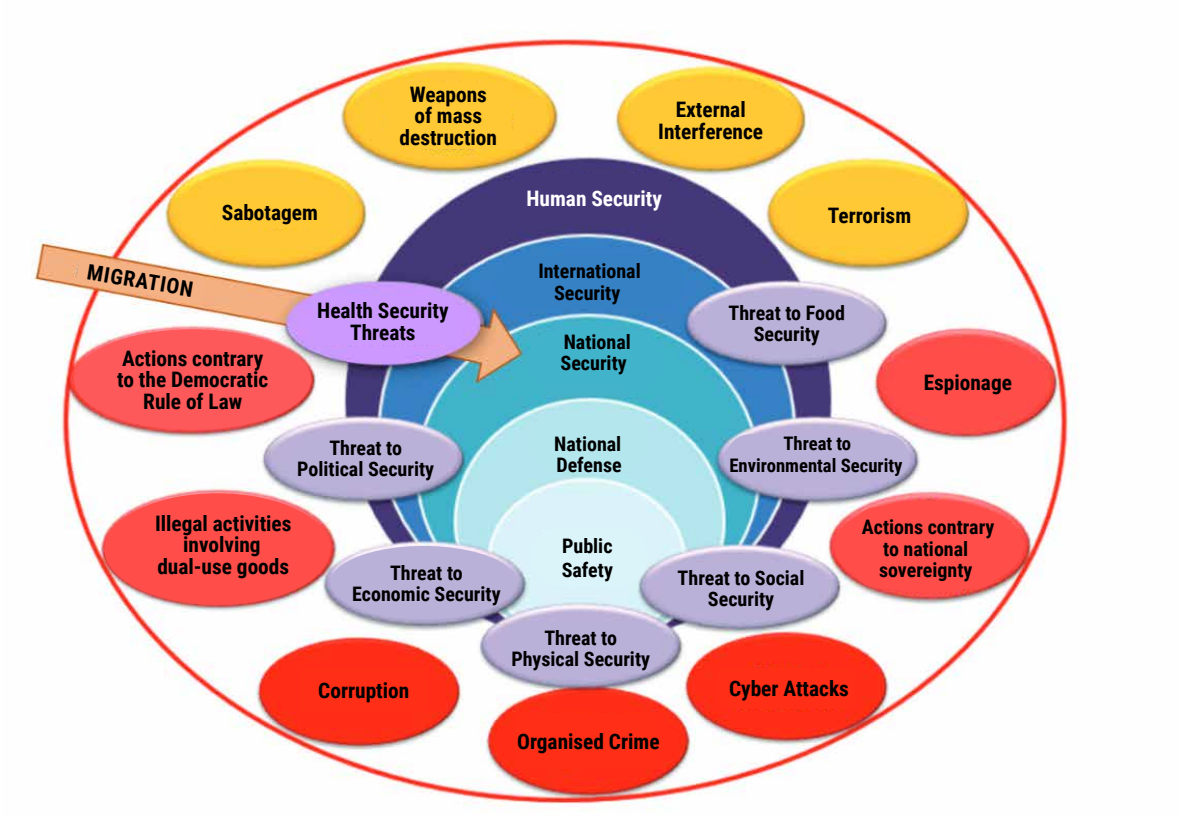
1 Population groups most exposed to poverty, disease, unemployment, violence, drug use, discrimination, malnutrition, premature death, among other risks.

TranscribeMe app (//newportal.transcribeme.com/). The data and information collected in the documentary analysis and questionnaires are presented in a descriptive form.

2 Health security and emerging and re-emerging diseases

The question of international security cannot be understood only by the absence of armed conflicts. Recent studies have established different dimensions of security, for example: a) national; b) international; c) collective; d) integral; e) human; f) democratic; g) common; h) cooperative; i) sustainable; and j) multidimensional (MARTIN, 2016). The understanding of human security goes beyond the reductionist view of protection against threats to physical security to encompass new security components, such as: economic, food, environmental, personal, health, community and political (GOUVEIA-CARVALHO, 2020; SANTOS; SILVA; GALLERA, 2020). Figure 1, below, illustrates the diverse and complex components of the expanded spectrum of multidimensional security threats in Brazil, highlighting the health threat related to the entry of migrants across borders.

Figure 1 – Broad spectrum of multidimensional security threats in Brazil

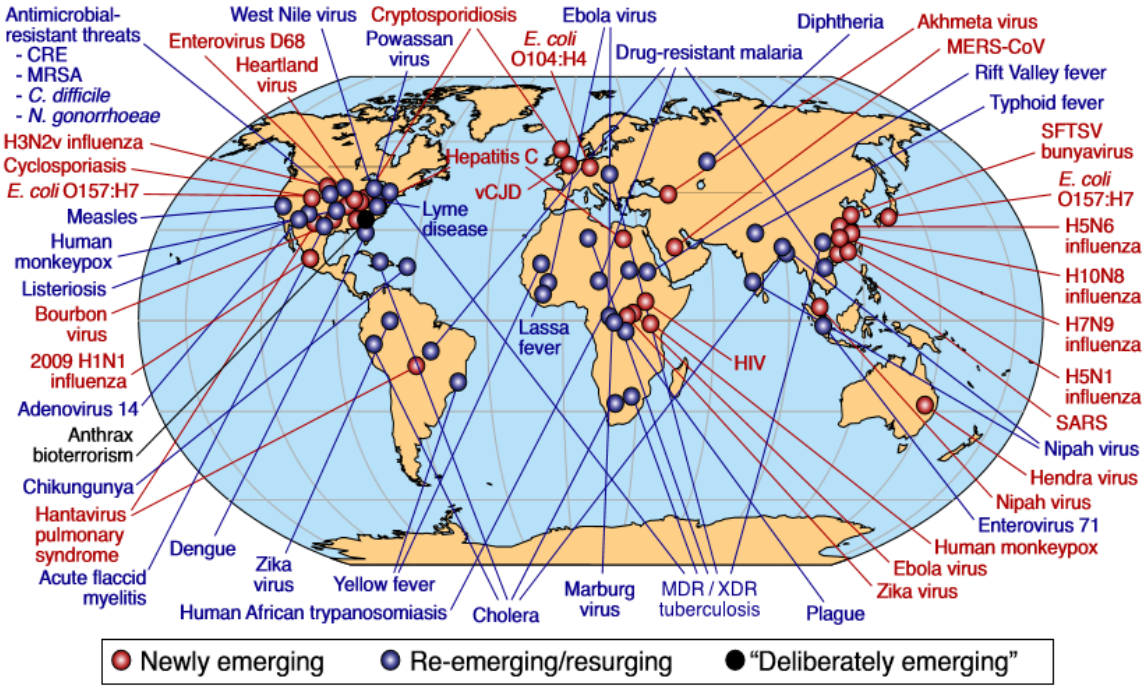


Source: adapted from Santos, Silva and Gallera (2020).

Health security essentially involves the protection of individuals and communities from disease, particularly infectious diseases. This component of Human Security assumes increasing prominence in the face of repeated outbreaks of infectious diseases, such as the COVID-19 pandemic.

The World Health Organization (WHO) has monitored the emergence of hundreds of emerging zoonoses over the past 50 years. The SARS epidemic in Asia in 2002 highlighted the vulnerability of borders to new pathogens. As a consequence, in 2005, the International Health Regulations (IHR) were reformulated, guiding the bioprotection capacities necessary to monitor, detect early and contain health emergencies of international interest. Since then, WHO has guided member countries in a global effort to train specialists, enable diagnostic laboratories, foster research into new vaccines and treatments, and promote the development of response plans to health emergencies, as recently occurred with the Ebola virus in Africa (GLOBAL PREPAREDNESS MONITORING BOARD, 2019). This mobilization is aimed at strengthening bioprotection capacities. Figure 2, below, presents the top 50 emerging and re-emerging infectious diseases that have challenged the world in the last 50 years, most characterized as zoonoses because they involve animals at source or in the transmission cycle.

Figure 2 – Emerging and re-emerging infectious diseases between 1970-2020



Source: Global Preparedness Monitoring Board (2019).

Some factors have contributed to this phenomenon of emergence and re-emergence of infectious diseases. Noteworthy are: a) biological and genetic factors (microbial adaptation

and mutations and human susceptibility to infections); b) the physical environment factors (economic development and land use and climate issues); c) ecological factors (change in ecosystems and demographic and behavioral aspects); and d) social, political and economic factors (international travel and trade, poverty and social inequality, wars, hunger, migration, refugees, lack of political will and intention to harm, in the case of bioterrorism/agroterrorism). In summary, the main determinants are globalization, environmental degradation, large population growth and humanitarian crises (KATARE; KUMAR, 2010).

The survey on the perception of risks by governments, companies and social actors, published in the World Economic Forum 2021 Global Risks Report, shows that infectious diseases represent the 5th position in the Top 10 in relation to the probability of occurring and the 1st considering the impact, in the perception of respondents (WORLD ECONOMIC FORUM, 2021).

3 Migration, Borders and Emerging and Re-Emerging Health Threats

Migration is a growing phenomenon in several regions of the world and around this complex problem are several secondary elements, one of these is the spread of infectious agents. Desai *et al.* (2020) analyzed publications between 1996 and 2016 that recorded outbreaks of infectious diseases associated with forced migrants/refugees. The authors identified, in 48 countries/territories, 128 distinct events and more than 840 thousand suspected or confirmed cases of diseases such as cholera, measles, cutaneous leishmaniasis, malaria and dengue.

Each country of origin of migrants has a set of diseases in circulation, a specific condition of the health system and a certain pattern of health and mortality, influenced by income, education, living conditions, basic sanitation infrastructure, among other factors. These health variables surrounding migrant populations are, in general, distinct from the nations receiving these vulnerable human groups (GUSHULAK; MACPHERSON, 2004).

This clash of health profiles has been responsible for the entry of new diseases in host countries and the resurgence of old diseases or controlled diseases. In the countries that received the most migrants in Europe until 2014, such as France, Germany and Italy, the proportion of HIV/AIDS and tuberculosis cases among migrants was higher than in the native population, sometimes more than double (CASTELLI; SULIS, 2017).

Between 2010 and 2020, several emerging and re-emerging diseases entered through land borders and Brazilian airports, such as Zika, Chikungunya, Measles, Mayaro, West Nile fever and COVID-19. The extension of the land border, of more than 17 thousand km, involving contact with ten countries, in addition to the intense flow of airplanes and ships, either with passengers or cargo, and demands a robust bioprotection capacity.

3.1 Health threats on the Brazil-Venezuela border in 2020

Since 2014, the social, political and economic crisis in Venezuela has triggered a serious humanitarian crisis, forcing the displacement of thousands of Venezuelan families to neighboring countries, in particular Colombia and Brazil. In 2018, the country was the main source of asylum applications in the world, with more than 340 thousand new applications. In 2019, it was estimated that 4 million Venezuelans had already migrated (OIM, 2019).

The Regional Interagency Coordination Platform2 indicates that Brazil received a total of 261,441 refugees and migrants from Venezuela, as of October 2020, among whom 145,462 had received a temporary or permanent residence permit in the country. The peak of asylum requests was in 2018, drastically reducing in March 2020, when the Brazilian borders were closed due to the COVID-19 pandemic (SILVA *et al.*, 2021). This closure caused a damming of those interested in migrating to Brazil, aggravating the internal crisis, and stimulated clandestine entry by uncontrolled routes on the porous border of Roraima with the state of Bolivar.

The Venezuelan health system has been unstructured for several years, with poor disease registration, low vaccination coverage, lack of arthropod Vector Control and low testing of diseases such as AIDS and tuberculosis (DESAI *et al.*, 2020). Between 2016 and 2018, major outbreaks of diphtheria, measles and malaria were revealed (TUITE *et al.*, 2018).

In 2016, the border state of Roraima registered an increase in the flow of Venezuelan immigrants for medical care, raising the risks of outbreaks of negligence to the Brazilian population due to the overload of the health service network. In the same year, a significant increase in imported cases of malaria, leishmaniasis, HIV/AIDS and tuberculosis was observed. The Venezuelan migratory flow in the state of Roraima favored the reintroduction of measles in Brazil in 2018, a disease considered eradicated in Brazil (BARRETO; RODRIGUES; BARRETO, 2018; MENESES *et al.*, 2019).

As of October 2019, 49,613 suspected measles cases have been reported in Brazil, with 15 deaths. This outbreak of vaccine-preventable disease was the result of the combination of two factors, the entry of the etiological agent through the Brazilian borders and the low vaccination coverage in 2018-2019, since recent vaccination campaigns did not reach the minimum protection condition with a coverage of 95% of immunized people (MEDEIROS, 2020).

In February 2018, the Brazilian federal government launched measures for emergency assistance to people in vulnerable situations due to the Venezuelan migratory flow, activating the Humanitarian Logistics Task Force in Roraima, also known as Operation Welcome, coordinated by the Ministry of Defense and integrated by multiple state actors, NGOs and international agencies. Since then, this unprecedented experience has been perfected and has become a success story (SILVA; ALBUQUERQUE, 2021).

2 The R4V platform - Response to Venezuelans is an interagency coordination of the United Nations system and civil society. Available in: https://www.r4v.info/es/node/247. Accessed: 10 Aug. 2021.

4 Borders and Agricultural Health Defense

Another component of border health security, which cannot be neglected, is protection against diseases that can cause serious damage to agriculture, with economic, social and food consequences. Brazil is seen as the great barn of the world and the share of agribusiness in Brazilian GDP reaches 30%, largely due to exports of agricultural *commodities* such as grain and meat.

If an infectious disease affects Brazilian herds, for example the foot-and-mouth disease virus in cattle, the consequences would be catastrophic, as the country is the largest global exporter of beef. The outbreak recorded in Europe, in 2001 in the United Kingdom, caused an estimated economic impact of 15 billion dollars (KNIGHT-JONES; RUSHTON, 2013). Brazil recorded its last outbreak of foot-and-mouth disease in 2006, on the border of Mato Grosso do Sul with Paraguay, taking three years to recover its sanitary *status* and resume its volume and profitability in international trade (AMARAL; GOND; TRAN, 2016).

Precariousness similar to that observed in the Public Health System of Venezuela also occurs in the Animal Health Service (*National Institute of Integral Agricultural Health* - INSAI), causing the health risks to agriculture to be unknown. According to Caetano (2017), Venezuela has 14 pests of high risk for Brazilian agriculture, with foot-and-Mouth Disease (FMD) being the most important. An important vulnerability in Venezuela is the low vaccination coverage of the cattle herd against foot-and-mouth disease, making it the only nation not recognized as FMD–free by the World Organization for Animal Health (OIE) in South America, putting the entire region at risk. In 2017, an outbreak of this virus occurred in the eastern region of Colombia, associated with the smuggling of infected Venezuelan animals (ROJAS ROMERO; ALVAREZ ESPEJO, 2019), causing an important alert on the Roraima–Venezuela border.

The entry of pathogens in the luggage of travelers crossing borders has already been characterized in the Melo researches *et al.* (2015), on clandestinely transported animal products. In the case of Venezuelan migration, this sanitary threat acquires even greater importance, since it can allow the entry of pathogens such as those that cause African swine fever, foot-and-mouth disease, brucellosis, tuberculosis, among others.

This scenario of health threats to Brazilian agriculture becomes even more relevant when outbreaks of animal diseases break out in the surrounding countries. After a catastrophic spread through Asia and Europe, African swine fever (ASF), a serious viral disease, arrived in the Dominican Republic in 2021 and the possibility of being introduced in Brazil means an important threat to pig farming. In addition to this factor, Brazil has committed, together with the World Organization for Animal Health (OIE), to suspend vaccination against foot-and-mouth disease in cattle and buffalo herds until 2026, a condition that requires, among other actions, a great reinforcement in agricultural surveillance at the borders (BRASIL, 2021).

5 Results and discussion

Each contingent of the Humanitarian Logistics Task Force (FTLH) – Operation Welcome is composed of about 600 Brazilian Army personnel who remain in Roraima for three to four months. These contingents are selected and trained by the eight Military Area Commands of the Brazilian Army.

The operation was structured to act in three aspects: a) border management, involving issues such as documentation and vaccination of migrants; b) reception with the offer of shelter, food and health care; and c) internalization, which organizes the displacement and reintegration of Venezuelans in other states (SILVA; ALBUQUERQUE, 2021).

Within the military component, structured as a large unit, there are the typical branches of the general staff, such as operations, logistics, intelligence, personnel, social communication, etc. The operation of the health cell, designated D11, is linked to the logistics function, in accordance with land military doctrine and interagency operations.

5.1 Health of military personnel and Venezuelans sheltered by the Humanitarian Logistics Task Force

Key military personnel from the 9th Contingent of Operation Welcome were interviewed, composed of military personnel from the Planalto Military Command (CMP) and the Western Military Command (CMO), consisting of 656 members who remained in Roraima from September 2020 to January 2021. In the health logistics cell of FTLH (D11), we sought to characterize the functioning of health support and the main health challenges. There is a medical unit at the FTLH main base, which operates out of barracks at the headquarters of the 1st Jungle Infantry Brigade in the military sector of the capital of Roraima, Boa Vista.

According to the Operation Welcome reports consulted, about 5,000 Venezuelans are housed in 16 migrant reception shelters, 14 of them in Boa Vista (Pintolândia, Latife Salomão, Nova Canaã, Santa Teresa, Tancredo Neves, Rondon 1, 2 and 3, Rodoviária, Jardim Floresta, São Vicente 1 and 2, Espaço Emergencial 13 Set, Pricumã) and 2 in Pacaraima (Janokoida and BV-8), in addition to the spontaneous occupations that persist. These shelters have continuous monitoring health teams from NGOs and international agencies. The D11 of the military segment of FTLH performs: a) biweekly health support in shelters (NSA); b) 24-hour emergency service; c) removal service (evacuation by ambulance to hospitals in Boa Vista, if the severity of the patient requires it); d) vaccination; and e) pre-boarding health inspection in internalization (*Fitness for travel*).

In 2020, among migrants, cases of COVID-19 and infectious diseases such as tuberculosis, syphilis, gastroenteritis and scabies stood out. In October of that year, an outbreak of COVID-19 occurred among migrants, but with a small proportion of laboratory-confirmed positive cases. The cumulative incidence among migrants, until the beginning of November 2020, reached 3% of positive (about 150 infected and 9 deaths). Field collection and documentary research revealed that many Venezuelans presented with COVID-19, but

with mild or asymptomatic presentation and did not have a confirmed diagnosis, being categorized as "suspected cases". The total casuistry indicated 617 more suspected cases, totaling a real incidence of 15% of infected migrants, with an approximate lethality of 1.3%, parameters similar to those of the population of Boa Vista.

To face the pandemic, FTLH implemented an innovative initiative the "Protection and Care Area" (APC), a kind of integration between a quarantine and a field hospital. Suspected or confirmed cases detected in the shelters were transferred with their entire family nucleus to the Protection Area (AP), where there were 250 housing units of the "modular houses" type (donated by ACNUR) ready to receive a family. In this area, up to 1,000 people could be housed, segmented into an isolation area for suspected cases (600) and an isolation area for confirmed cases (400). The protection and care area served another 11 thousand people, until November 2020, not only Venezuelans, but other foreigners and many military and civilians from the Boa Vista garrison, at a very critical moment in the pandemic[3].

Chart 1, below, lists the main causes of medical care in 2019, indicating that the main groups of diseases that commonly affect Venezuelans, before the pandemic, were respiratory system diseases (33.3%) and infectious and parasitic diseases (15.3%). This profile resembles the one identified by Van Loenen *et al.* (2018), among migrants arriving in Europe.

Table 1 – Profile of the main causes of medical care for Venezuelan migrants by the military segment of Operation Welcome, 2019

Classification of health problems (ICD-10) %	%
J00 – J99 Diseases of the respiratory system.	33,3
A00 – B99 Certain infectious and parasitic diseases.	15,3
NOO – N99 Diseases of the genitourinary system.	8,9
LOO – L99 Diseases of the skin and subcutaneous tissue.	6,8
KOO – K93 Diseases of the digestive system.	6,8
000 – 099 Pregnancy, childbirth and puerperium.	6,1
MOO – M99 Diseases of the musculoskeletal system and connective tissue.	5,3
GOO – G99 Diseases of the nervous system.	3,0
100 – 199 Diseases of the circulatory system.	2,8
F00 – F99 Mental and behavioral disorders.	2,0
Other diagnoses.	9,6

Source: the authors with data from the Humanitarian Logistics Task Force (2020).

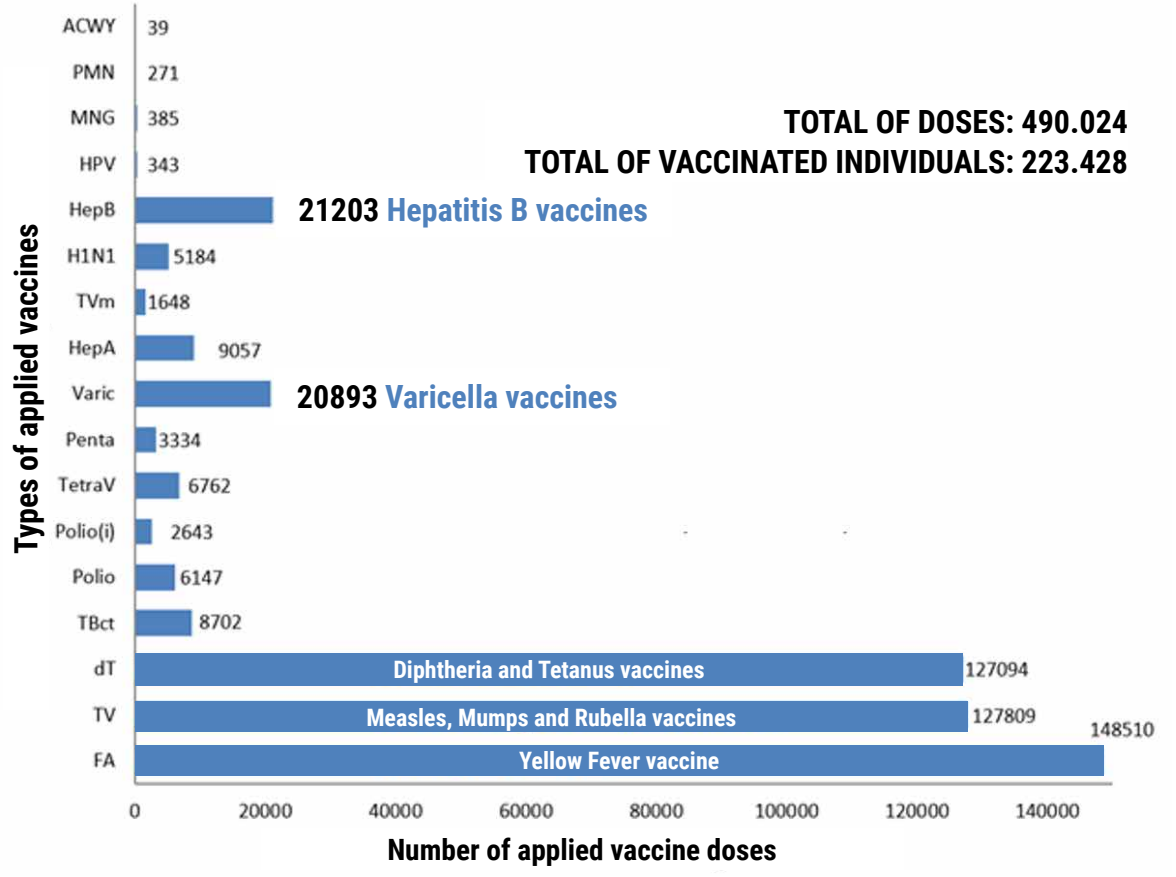
3 Data collected in the visit to Operation Welcome and in the presentations made available by the APC manager and the head of the health cell (D11), in November 2022.

5.2 Preventive and "single health" actions in the hosted operation

The APC has shown itself to be a very robust initiative to confront the pandemic, preventing the spread of the virus and promptly attending to severe cases. Operation Welcome, at its screening points in Pacaraima and Boa Vista, carries out an important preventive immunization action for adult and child migrants, who voluntarily accept immunization. At the screening point itself, the SUS (Brazilian health care system) card is issued to the migrant, so the doses of the vaccines administered are immediately entered into the Information System of the National Immunization Program, which contributes to greater control and monitoring of the vaccination coverage of this population, a very positive point observed in the Operation Welcome.

Figure 3, below, summarizes the numbers of immunized since the beginning of the operation in March 2018. This is an effective action to prevent the entry of diseases into Brazil and promote health security at the border. This measure would be even more effective if immunization upon entry into Brazilian territory were mandatory, a condition allowed by the WHO International Health Regulations (ANVISA, 2009b).

Figura 3 – Vaccines applied to Venezuelan migrants in the Humanitarian Logistics Task Force (March 2018 to October 2020)



Source: the authors with data from Operation Welcome (2020).

The Humanitarian Logistics Task Force, since 2018, has incorporated a modern practice of protecting the health of troops and migrants and provided for in the health doctrine in joint operations – the medical veterinary officer as in charge of "single health" actions, that is, health threats related to the human-animal-environment interface (BRASIL Moderna, 2017). The priority areas of activity of the veterinarian in the operation are: a) food safety; b) Water Quality Control; c) zoonoses control; d) vector control; e) pest control; f) environmental management (including effluent and solid waste management); g) veterinary clinical assistance; and h) health Intelligence (epidemiological surveillance). This important bioprotection capacity of the troops and migrants was detailed in the work of Barros and Lima (2021).

The area of responsibility of the veterinarian in the operation is wide, including the Administrative Bases of the cities of Boa Vista and Pacaraima; the immigrant care posts, including the internalization and screening post and the Reception and Care Post (PRA); 14 immigrant reception shelters, spontaneous occupations; and the military organizations that house and feed the FTLH military. Companion animals (dogs and cats) found in migrant shelters are registered, examined, neutered, vaccinated, de-wormed and accompanied. Data from the 6th Contingent, which operated in the second half of 2019, register 41 companion animals identified in shelters[4].

The activities defined in the priority axis of the operation called WASH (*Water, sanitation, and hygiene*), are essential to maintain the quality of life of sheltered migrants. These activities involve monitoring the quality of water consumed, garbage and sewage management and hygiene in the facilities, being coordinated by the FTLH veterinarian. Part of the migrants food comes from contracted firms that provide the ready-made meal, in the "quentinha" (packed-lunch) format. The veterinarian audits the process, inspects good practices and oversees the contract of the outsourced company. These activities are developed in a similar way to those conducted by the veterinarian in peacekeeping battalions deployed in United Nations missions (LIMA, 2016).

5.3 Agricultural Health defense in the context of the Brazil–Venezuela border

Key veterinary inspectors from the official state and federal Agricultural Defense Service in Roraima were interviewed. Regarding the structure of services on the Roraima–Venezuela border, an adequate structure of vehicles, equipment, resources and personnel was identified in the state agency (ADERR). Differently, in the Federal Superintendency of Agriculture in Roraima (Ministry of Agriculture, Livestock and supply – MAPA) there is a limitation of federal agricultural inspectors (only four veterinarians for the entire state) and the border posts only work during administrative hours and with mid-level technicians in routine shift/relay, closing at night. The main strategy adopted is the installation of fixed control points of the state agricultural inspections (ADERR) and federal (MAPA) in the

4 Data collected by the authors in the reports of Operation Welcome (2020).

state of Roraima, as well as in the potential access routes of pests. There are only three checkpoints on the map (in the cities of Boa Vista, Pacaraima and Bonfim), due to the acute lack of veterinary inspectors. The state agency reinforces this bioprotection network, installing mobile points on roads near the border, with 24-hour operation[5].

In addition to federal highways, there are several roads that cross the border, not asphalted, but which allow the clandestine entry of people, vehicles and products. This situation and the lack of knowledge about the real sanitary situation of the herds in Venezuela are the issues that put the Official Agricultural Defense Service on alert for the risk of pests entering Brazil.

In 2018, there was an outbreak of foot-and-mouth disease in Colombia and reports of cases of cattle with signs and symptoms by Venezuelan breeders near the border with Roraima less than 200 km from the Brazilian border[5]. These reports and the alert of the secondary outbreak registered in Colombia led to the mobilization of a rigorous sanitary barrier operation and a large vaccination campaign, in Venezuelan herds up to 500 km across the border, with immunizer donated by Brazil. These coordinated actions in conjunction with INSAI (*National Institute of Integral Agricultural Health* of Venezuela), were very effective, but unfortunately did not occur in 2019 and 2020 due to the pandemic and lack of interest from the Venezuelan counterpart[6].

A vaccination reinforcement was also triggered on the Brazilian side of the border, especially in herds located on indigenous lands and areas of difficult access, some with only helicopter support. In this last operation, carried out between April and May 2019, more than 48 thousand head of cattle were immunized in the regions of Uiramutã, Normandía and Pacaraima.

In 2020, with the closure of the border, the inspection of clandestine entries was intensified by MAPA. Contraband of large quantities of curd cheese (raw dough cheese), meat and many vegetable products were seized at mobile checkpoints on roads near the borders. In the inspection routine, integrated operations of MAPA are planned with the Brazilian Army, Federal Police, Federal Revenue Service of Brazil (RFB) and other agencies on clandestine roads on the Brazil-Venezuela border. After the border was closed in early 2020, a large volume and variety of clandestine meat products were seized on these routes. Many of these products are used by migrants to feed their families on the long journey to the interior of Brazil, until they find sources of income for sustenance[6].

5 Data collected by the authors in the reports of SFA/MAPA/Roraima (2020).

6 Data collected by the authors in interviews with the agricultural inspectors of ADERR and SFA/MAPA/Roraima (2020).

5.4 Health vulnerabilities on the Roraima–Venezuela border

It has been identified an important first health vulnerability, the absence of an epidemiological surveillance structure in the Operation Welcome. The health cell (D11) does not regularly have health professionals with expertise in epidemiology and data on the illness of migrants are not collected and monitored. In the 9th contingent of the FTLH, due to the closure of the border, a nurse officer who would stay at the screening post of Pacaraima (city on the border with Venezuela) was moved to Boa Vista and began this surveillance work.

In relation to migrants, some agencies, such as ACNUR, ADRA, Fraternity Without Borders, International Fraternity have health agents or focal point in each shelter and regularly collect data on the health of those sheltered. After analyzing these health data, the agencies request support from the military or the Roraima health department to carry out specific actions, for example, vaccinations, assistance teams, referral of cases that need special care, such as HIV, tuberculosis, malaria, syphilis, etc.[7]

It was identified the need for the health cell (D11) to maintain a closer interaction with the agencies that deal with the health data of the shelters, seeking the sharing of information. This procedure is important not only for the FTLH to have clarity about the sanitary reality and health protection in shelters under the responsibility of the military segment, but also because the troops interact regularly with the sheltered populations and after the contingent period returns to their military area commands and can be exposed to infectious diseases and disperse these diseases to other Brazilian states.

A second health vulnerability identified, in regard to health security, border and migration, was the lack of knowledge about the previous health condition of Venezuelan migrants upon entry into the country and in the Operation Welcome. As illustrated in Figure 1, the flow of migration, especially across land borders, can contribute to the entry of pathogens, causing outbreaks at the destination. No integration of Brazil with the Venezuelan health system was observed and health threats are not among the priorities of the Intelligence Cell of Operation Welcome (D2). In addition, the national legislation that regulates the treatment of refugees/migrants does not require them to be vaccinated or examined (inspection) upon arrival at the Brazilian border, allowing many to enter not adequately immunized and, sometimes, being carriers of diseases.

The vulnerability related to the lack of knowledge of the sanitary condition on the Venezuelan side of the border is also true for animal health. There are no current and reliable statistics on vaccination of Venezuelan herds, circulating diseases, outbreaks, mortality, etc. This makes it difficult to analyse the health risk at borders.

A third health vulnerability raised consists of the entry of illegal migrants through the Roraima-Venezuela land border. Several members of Operation Welcome confirmed that even after the closure of the border due to the pandemic, hundreds of Venezuelans are found in Boa Vista – RR, without documentation or any registration of entry into the country. In addition to the sanitary risk, other risks are associated with this phenomenon,

7 Data collected by the authors during visits to shelters and interviews with members of Operation Welcome, in Roraima (2020).

since this type of entrance is completely uncontrolled. Through this illegal route, live animals and contaminated food can also enter, putting Brazilian agriculture at risk.

A fourth health vulnerability was characterized by the deficient agricultural defense structure of MAPA in Roraima, especially the lack of tax authorities. The fragile installed capacity of agricultural health surveillance at borders, ports and airports has already been characterized in the ANVISA survey (2009a), in which it was indicated that less than 40% of these entry points had the minimum conditions to monitor, detect, respond and communicate the risk of health threats. Several weaknesses in the actions implemented by the International Agricultural Surveillance System (VIGIAGRO) were pointed out in an audit carried out by the Federal Court of Accounts (BRASIL, 2012B). The aforementioned court of accounts made important recommendations, especially the need for MAPA/VIGIAGRO to act in the border strip in an integrated manner with the other inspection bodies, components of the Border Protection Program.

5.5 Integrated Health Security, lessons learned in the context of Operation Welcome and the Brazil–Venezuela border

Security and defense in Brazil are structured to face multiple threats, as illustrated in Figure 1. The protection of society involves an integrated security strategy, understood as broad-spectrum measures, involving, in addition to external defense, civil defense, public security and economic, social, educational, scientific-technological, environmental, health and industrial policies, as defined by the National Defense Policy (BRASIL, 2012a).

The results of this study indicate gaps in the field of intelligence, either due to the lack of knowledge of the health threats present on the Brazil-Venezuela border, or due to the precarious epidemiological surveillance of human and animal diseases. Another point that stands out is the lack of integration between actors from the health field in the Operation Welcome, such as doctors, veterinarians, nurses, health agents from NGOs, members of the D11 cell, among others. This same lack of integration and information sharing is observed among human health and agricultural defense agents, as well as with other tax authorities and institutions operating at the border, such as the Federal Police, ANVISA, Brazilian Federal Revenue, Brazilian Army, etc. These findings characterize a lack of integration between the agencies responsible for health security at the border, characterizing several vulnerabilities. Measures are needed to securitize the border in the field of bioprotection, with measures already tested and approved in similar situations, such as at European borders (BENGTSSON; RHINARD, 2019).

After analyzing the scenario and health vulnerabilities, the following opportunities are listed to strengthen health protection at the Roraima-Venezuela border and contribute to integrated security:

a) sharing epidemiological information;

b) training of intelligence personnel for interagency operations, leveling the minimum knowledge on biosecurity, bioprotection, sanitary security and agricultural defense;

c) displacement of technical personnel and agricultural auditors to the border either by tender, assignment of technical personnel from other ministries (for example, selection of temporary Veterinarian Officers from the Brazilian Army for this specific mission in support of MAPA; remuneration and career progression incentives for tax inspectors who remain at least two years at the border, etc.);

d) conduct modeling studies on the risk of disease entry through the northern border, as well as estimate the financial impact of the possible entry of foot-and-mouth disease and African swine fever originating in Venezuela;

e) activate an epidemiological intelligence unit in Operation Welcome to record and monitor the evolution of diseases in the troops and migrants, conducting constant risk analysis and building predictive scenarios;

f) create in the head of logistics of the Ministry of Defense a Health Surveillance Center, responsible for the selection and appointment of veterinarians for the contingents of the Operation Welcome, as well as guiding the training and performance of these specialists, in order to allow continuity and memory of the collective health data of the operation. This same center would serve to coordinate the actions of troop health protection, food defense and epidemiological intelligence in all joint operations and peacekeeping missions with Brazilian contingents; and

g) conduct studies on the integrated border security model adopted in developed countries in Europe and North America, aiming to define the most appropriate model for the Brazilian reality, which may be the creation of a National Integrated Border Security Agency, responsible for the governance of the current Integrated Border Protection Program (PPIF), which works under the Coordination of the Institutional Security Office (GSI), a strategic body that performs various and complex missions.

6 Final Considerations

The emergence of infectious diseases and migration are phenomena that have worsened recently. This study investigated aspects of health security in the northern border of Brazil, more specifically in the region of Roraima, the border between Brazil and Venezuela. The installed bioprotection capacities and the impacts associated with the migratory crisis of Venezuelans entering Roraima since 2014 were analyzed. The health routine of Venezuelans sheltered by the Humanitarian Logistics Task Force in Roraima – Operation Welcome was characterized. The structure and actions of the agricultural defense in Roraima were investigated. It was characterized by some circulating diseases at the border, potential health threats to the troops, to the Brazilian population and to agriculture. Four health vulnerabilities arising from behaviors or deficiencies in the installed capacities of epidemiological surveillance and agricultural defense were mapped.

The results allow us to indicate some strategic actions to securitize the border region in focus. To strengthen health security at the northern border and bioprotection in Operation Welcome, the importance of integrating intelligence between the various agencies operating at the border and in Operation Welcome, as well as in agricultural defense, is highlighted.

This study had some limitations, among them access to few epidemiological data, procedures, protocols recorded on the sanitary aspects studied at the border and in the Operation Welcome. It should be noted the scarce bibliography and the rare studies that have integrated aspects of public health and agricultural health defense in the border area. Due to time and resource limitations, the bioprotection capacities linked to the agencies of the Ministry of Health and the State Secretariat of Health in Roraima, as well as ANVISA and the Ministry of the environment, were not investigated

As future work, it is suggest follow-up studies on the constructs discussed, such as detailed monitoring of the health of migrants, troops components of Operation Welcome, international agricultural surveillance and related actions. Investigating the actions and structures linked to the federal and state health sector will be relevant to complete the mapping of bioprotection capacities in the Brazil-Venezuela border region. Modeling studies on the risk of diseases entering the northern border and estimating financial impacts will be important subsidies for decision-making and prioritization of aspects of epidemiological intelligence, health intelligence and integration of border security actions.

Authorship and collaborations

All authors participated equally in the preparation of the article.

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