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BASIC SANITATION AND THE BLACK POPULATION: the veterinarian's role in one health

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ABSTRACT

Basic sanitation is established as a right of every Brazilian citizen and is essential for maintaining the health of a society. The structuring of this sector in the country has been marked by racism, where access to these services primarily benefited the white population, while the Black population was excluded from this process, remaining exposed to various health-related issues. In light of the above, this study aimed to conduct an integrative literature review to understand the factors that led these individuals to experience deficits in sanitary conditions and to analyze the role of veterinarians in addressing this reality. The findings show that Black individuals in Brazil have had their rights to basic sanitation denied, making them the group most affected by illnesses and mortality resulting from this situation. It also demonstrates that veterinarians are essential professionals who can contribute to changes in this scenario.

Keywords: Vaccinia virus, dairy cattle, human health, geoprocessing

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INTRODUCTION

The historical context of the development of basic sanitation in Brazil has been defined by numerous processes characterized by delayed implementation, intense modification of urban spaces, and disparities in the provision of sanitation services based on socioeconomic, racial, and cultural factors (Rossoni et al., 2020). As a result, health conditions in Brazilian territory have also been structured according to these configurations, since the sanitary conditions of a population influence and generate indicators of well-being. Without these services, individuals are at high risk of experiencing a decline in quality of life, with increased morbidity and mortality from various diseases that spread under such conditions (Bovolato, 2015).

Since the early days of Brazil, the Black population has faced unhealthy sanitary conditions, being treated as individuals capable of creating basic sanitation infrastructures for a portion of the population, yet excluded from these resources themselves, deprived of the right to enjoy better environmental dignity (Rosembergs & Pinto, 1995). Consequently, housing and spaces where the state did not ensure sanitary security were mostly occupied by Black individuals, as a result of a past marked by racism, which exposed them to numerous health issues arising from this situation, further intensifying the health-disease-death processes experienced by this segment of society (Jesus, 2020).
With the advent of the Unified Health System (SUS) in Brazil, veterinarians have gained greater recognition as health professionals, as they are trained not only to address animal welfare issues but also to engage with environmental conditions and how these factors influence human quality of life (Souza et al., 2021). Consequently, the concept of One Health has expanded in this field, being associated with multidisciplinarity and the implementation of cross-sectoral actions, prioritizing the study of the human-animal-environment interface to establish a healthy society. Thus, veterinarians can reduce health risk factors for specific groups and, consequently, help decrease inequality in the country (Nogueira, 2018).

LITERATURE REVIEW

Characterization of Basic Sanitation in Brazil

History of the Development of Basic Sanitation:

The awareness of the need for a basic sanitation infrastructure in Brazil only began to take shape after the Proclamation of the Republic, at the beginning of the 20th century, when public health responsibilities became a duty of the State (Miranzi et al., 2010; Díaz et al., 2020). However, even though improvement projects were initiated, the services were highly inefficient, leading to increasing public dissatisfaction with the sanitary issues of the time, which created even greater insecurity around this topic (Santos et al., 2018).

Due to these issues, the country was seen as deficient in public health compared to other nations at that time, and newspapers frequently reported on all the problems and consequences arising from the national situation (Turolla, 2002; Díaz et al., 2020). With the spread of epidemics from Europe also reaching Brazil, it became necessary to further strengthen sanitary control methods to reduce the economic impacts caused by diseases, which brought even more attention to these issues from the government (Polignano, 2001).

In this context, efforts were made to eradicate these issues in the country, with street cleaning, as well as the clearing of mansions and land plots, to reduce the number of breeding sites for insects and rodents, which were the main vectors of the most severe diseases of that time, such as malaria and bubonic plague (Cavinatto, 1992; Ribeiro & Rooke, 2010). Sanitary inspections at ports and vaccination campaigns were also carried out to contain the spread of diseases (Cruz, 1992; Porto, 2003).

Based on these efforts, significant changes gradually occurred in Brazilian society in favor of building a more efficient sanitation model, including improvements in public health education (Díaz et al., 2020; Lima et al., 1996). Initially, the priority was to construct a sanitation infrastructure that would enable the country to continue its coffee export activities through the ports and ensure the safety of other countries engaging in economic relations with Brazil. This initial effort also aimed to change the external world's perception of Brazil's sanitation conditions (Polignano, 2001).

For these reasons, these transformations were primarily seen in the country's capital cities, while rural areas still needed movements that would raise awareness among authorities about the necessity of ensuring public health in the countryside, through proper reporting and dissemination of the rural sanitation conditions in Brazil, in an attempt to create a unified national approach to sanitation issues (Greco & Piterman, 2005).

From 1930 onwards, with the creation of the Ministry of Education and Public Health, the State began to more concretely address issues related to sanitary control and basic sanitation, placing greater emphasis on water-related matters in Brazil, specifically concerning contamination and supply (Silva, 2016). The country's participation in the Pan American Health Organization (PAHO) and the World Health Organization (WHO) further contributed to the direction and development of public policies for basic sanitation (Lima, 2002).

The issue of basic sanitation was also affected by the migratory movement that began in 1930, marked by a large displacement of people from rural areas to cities, mainly due to the onset of building a more industrialized country with an economy oriented towards the production of other goods, such as oil (Baeninger, 2005). Additionally, the mechanization of agricultural activities, the construction of large infrastructures in rural areas, and the loss of land use opportunities for workers, whether for

subsistence or housing, also intensified this rural-to-urban flow (Goldfarb, 2006).

This movement was particularly stimulated in the 1950s and 1960s, during which there were records of 900,000 people migrating to Paraná and 700,000 people moving to São Paulo in search of work (Fausto, 1994). Goldfarb (2006) reported that Brazil's urban population increased from 36% to 55% in 1970 and to 67% in 1980.

Diante desse processo, as grandes cidades urbanas não estavam preparadas para receber esse grande contingente de pessoas advindas do campo, ocasionando grandes problemas socioeconômicos (Goldfarb, 2006). Como não havia políticas públicas que adequassem essa nova população a esse espaço, se iniciou um processo de habitação de locais inadequados para moradia, com péssimas condições de saneamento básico e saúde ambiental, uma vez que não existia um aporte financeiro que permitisse a essa população um outro tipo de vivência, levando-os a marginalização (Fonseca, 2020).

Several factors contributed to the persistence of this issue in major urban centers, where state efforts to address the problems were unsustainable, and the housing crisis at the time further pushed low-income populations to the outskirts, which expanded and transformed year after year, exacerbating housing-related health issues (Fonseca, 2020).

Within the context of rural exodus, the Black population was identified as the main group involved in this movement toward large urban centers, as there was a shift in the type of labor directed at this population following the abolition of slavery (Goldfarb, 2006). Thus, many migrated to the cities in search of new job opportunities, yet continued to face marginalization in these new spaces (Goldfarb, 2006).

The Process of Rural Exodus:

The issue of basic sanitation also intersected with the migratory movement that began in the 1930s, marked by a significant shift of people from rural areas to cities, primarily due to the initiation of building a more industrialized country with an economy focused on producing other goods such as oil (Baeninger, 2005). Moreover, the mechanization of agricultural activities, the construction of large-scale infrastructure in rural areas, and the disruption of land use opportunities for workers, whether for subsistence farming or housing, further intensified this rural-to-urban migration flow (Goldfarb, 2006).

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In the face of this process, large urban cities were unprepared to accommodate the significant influx of people from rural areas, leading to severe socioeconomic problems (Goldfarb, 2006). Since there were no public policies to integrate this new population into urban spaces, a process began where people inhabited unsuitable areas for housing, characterized by poor basic sanitation and environmental health conditions. The lack of financial support to afford better living conditions drove this population into marginalization (Fonseca, 2020).

Several factors contributed to sustaining these issues in major urban centers. The state's efforts to address these problems proved unsustainable, and the housing crisis of the time further redirected low-income populations to urban peripheries. These peripheral areas continued to grow and transform year after year, exacerbating issues of substandard housing and unsanitary conditions (Fonseca, 2020).

Within the context of rural exodus, the Black population was identified as the primary group driving this migration to major urban centers, as labor dynamics shifted for this demographic following the abolition of slavery (Goldfarb, 2006). Many moved to cities in search of new job opportunities, yet they continued to face marginalization in these new environments (Goldfarb, 2006).

SUS and Its Broader Definition of Health:

The Unified Health System (SUS) was formally established in 1990, when it was regulated through the Lei 8.080 (Brazilian Organic Health Law), which addresses aspects of the system's functioning and defines health as a right for all and a duty of the State (Polignano, 2001).

The frameworks that support SUS aim to ensure universality, equity, comprehensiveness, hierarchy, political-administrative decentralization, and popular participation in health-related matters within the national territory (Almeida, 2013). Thus, the creation of this model emerged to enable the development of actions and services aimed at promoting, protecting, and restoring health (Almeida, 2013).

With the advent of SUS, the concept of health expanded beyond what was initially proposed at that time, including other aspects as important factors to prevent the occurrence of disease processes (Reis et al., 2006). Since then, health has been understood as dependent on a series of positive social and economic indicators, such as access to basic sanitation, decent housing, adequate nutrition, income conditions, leisure, and others (Rossetti, 2015). In this sense, it becomes clear that addressing insufficient social conditions experienced by part of the population is also part of SUS's role in promoting health (Motta, 2004).

According to SUS legislation regarding basic sanitation, the system has the function of ensuring the development of policies and the implementation of actions that aim to guarantee these services for the population, while also integrating them with environmental management strategies (Bilibio et al., 2021).

Basic Sanitation as a Right:

After unsuccessful attempts to develop a project for the planning and implementation of basic sanitation services in Brazilian territory, a new model was established with the creation of the Lei de Diretrizes Nacionais para o Saneamento Básico (LDNSB - Law No. 11.445/07) in 2007, thereby federalizing aspects related to this sector (Cunha, 2011). According to this framework, actions directed at basic sanitation would henceforth involve the federal government, federative units, and municipalities (Motta, 2004).

Now established as a right of all Brazilian citizens and a duty of the State to ensure, basic sanitation is defined as a set of services, infrastructure, and operational facilities for potable water supply, sewage systems, urban cleaning, solid waste management, and urban stormwater drainage and management (Decree-Law No. 11.445/07, 2007). This new approach underscores the importance of health linked to the need for quality of life, addressing aspects of urban development planning and the reduction of poverty rates in Brazil (Díaz et al., 2020; Bilibio et al., 2021).

Basic sanitation is also defined differently by various scholars, such as the provision of public services to minimize and eradicate waterborne diseases transmitted through fecal-oral contamination (Begum Ahmed & Sen, 2011; Kumar & Vollmer, 2013). Rossetti (2015) points out that the implementation of basic sanitation actions encompasses the maintenance of life itself, as its absence will lead to numerous problems. Other authors also consider basic sanitation as a fundamental factor for ensuring human dignity (Carcará et al., 2019).

Discussions about basic sanitation vary according to the specific context of the study, as it differs for each reality, addressing aspects related to culture, historical context, and the relationship between humans and nature, considering whether this relationship is harmonious or disharmonious (Silva, 2017). Thus, it is clear that there are significant disparities in basic sanitation actions between economically disadvantaged countries and those in better financial conditions (Reis et al., 2016).

Current Perspectives on Basic Sanitation in Brazil:

In 2020, Lei No. 11.445/2007 was amended by Lei No. 14.026/2020, introducing updates to the regulation of basic sanitation in Brazil (Decree-Law No. 14.020/20, 2020). As a result, several goals were established for the country, such as achieving universal access to water supply for up to 99% of the population and ensuring wastewater collection and treatment for up to 90%, with the aim of improving individuals' quality of life. This commitment is expected to be fulfilled by 2033 (Fernandes et al., 2022). Additionally, the law emphasizes reducing water wastage and recovering watersheds (Fernandes et al., 2022).

A 2011 survey conducted by the Instituto Trata Brasil showed that Brazil ranked 112th in basic sanitation among 200 countries, highlighting the country's economic and social disparities. Despite this ranking, Brazil was considered the seventh-largest economy in the world at that time (Souza & Garcia, 2021). The 2022 National Sanitation Ranking survey conducted by the Instituto Trata Brasil revealed that, of the 100 largest cities in the country evaluated, 94.38% of the population had access to potable water, while the national average was 84.13%. Regarding municipalities with a sewage collection network, the study showed that 75.69% of the analyzed cities had this service, while the national average was 54.95%.

The survey also showed that, among the 20 worst cities in terms of basic sanitation, 12 are located in the Northern and Northeastern Regions, while 14 of the 20 best-ranked cities are located in the Southern and Southeastern Regions (Trata Brasil, 2022). Data from the National Sanitation Information System (SNIS) in 2020 further highlight these disparities among the regions of Brazil, where the Northern and Northeastern Regions have significantly lower access to sewage collection and water supply compared to the Southern and Southeastern Regions. Scholars attribute the lack of universal access to basic sanitation services primarily to inadequate planning, insufficient investments, and a historical failure of the State to act in these regions that face poorer conditions (Macêna, 2021).

The data on the population without access to water and sewage collection by region, according to SNIS in 2020, are presented in Table 1.

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Table 1. Population without access to water and sewage collection by region in Brazil in 2020.

Region	Without access to water (%)	Without access to sewage collection (%)
Midwestern	9,1%	40,5%
Northeastern	41,1%	86,9%
Northern	25,1%	69,7%
Southeastern	8,7%	19,5%
Southern	9,0%	52,6%

Source: SNIS (2020)

In Brazil, there are also disparities in the provision of sanitation services between rural and urban areas, with data showing that only 22% of the rural population, comprising 31 million inhabitants, have access to adequate basic sanitation services (Resende et al., 2018). Data from DATASUS (Department of Informatics of the Unified Health System) in 2020 indicate that the country registered 167,513 hospitalizations due to waterborne diseases and 1,898 deaths resulting from these conditions, highlighting an urgent public health issue.

Characterization of Basic Sanitation in Brazil

Historical Development of Basic Sanitation:

The relationship between basic sanitation and the Black population since the early days of colonial Brazil was built on unsanitary conditions and the exclusion of these people from access to even the minimum standards of sanitary dignity (Williams & Priest, 2015). During the transatlantic slave voyages, enslaved peoples already endured the violence caused by inadequate environments, characterized by degrading facilities where they were forced to live amidst their own excrement and extreme overcrowding (Rubenich, 2016). Additionally, they consumed their restricted meals in the same spaces, amidst the foul odor, making the act of eating as dehumanizing as possible (Rubenich, 2016). Due to these conditions, many developed diseases such as cholera and did not survive the journey to the continent (Conrad, 1985; Klein, 1987; Chalhoub, 1996).

The perpetuation of these inequities against people of African origin continued upon their arrival on Brazilian soil (Cruz, 1993). Black individuals assigned to labor in rural areas were exposed to exhausting and hazardous working conditions, with a high risk of contracting infectious diseases, as there were no sanitary precautions in place (Jesus, 2017). In major urban centers, enslaved people worked in domestic labor or performed street services in cities that lacked sewage systems, placing them in a situation of extreme vulnerability, as exposure to waste and excrement was a daily reality (Jesus, 2020).

The senzalas (slave quarters) did not provide adequate sanitation conditions, and the Black population had to live with the constant presence of rats, cockroaches, and mosquitoes in overcrowded spaces with few windows (Silva, 1988; Rubenich, 2016). The consumption of contaminated water and food, often in insufficient quantities, resulted in an average life expectancy of around seven years for the Black population, as these conditions weakened them to the point of succumbing to parasitic infections, verminoses, and diarrhea (Karasch, 2000). Within these conditions, the elderly and children were the most vulnerable to mortality from such causes (Klein, 1987; Karasch, 2000).

Even though they were excluded from the sanitation processes of Brazilian territory, enslaved Black people were tasked with ensuring certain sanitary practices for city inhabitants (Jesus, 2017). They were responsible for removing waste and excrement from major urban centers using barrels and dumping them into rivers or beaches far from their place of origin (Karasch, 2000; Farias et al., 2006). Enslaved people were also in charge of supplying water to public institutions of the time, such as hospitals and government buildings, and performed construction work involving drainage and urbanization projects (Gonzalez, 1982).

Urban Spatial Segregation:

After the abolition of slavery, the Republican Brazil emerged with different ideals regarding the political, economic, and social projects related to sanitation across the territory, yet the Black population continued to be excluded from any proposed changes (Jesus, 2020). The lack of housing and economic resources experienced by Black people during this period forced them to live in the so-called cortiços, which were characterized as poorly structured houses with no sanitary conditions and which did not meet the proposed European standards (Borret et al., 2021). Moreover, these spaces were targets of prejudice as they were associated with poverty and viewed as a hindrance to the country's financial progress (Silva et al., 2021).

Disturbed by the presence of these environments in the cities, the state initiated a political urbanization project aimed at eliminating cortiços to create a new social model (Borret et al., 2021). This new perspective was rooted in eugenic ideals of whitening the country by reshaping its racial composition, along with sanitary policies that blamed the Black population for poverty and epidemic diseases of the period, which did not align with the expectations of a modern nation (Jesus, 2017).

Thus, the eugenic and sanitary political and socioeconomic project served as a foundation for structuring the bases of urban planning in Brazil, from which the Black population was excluded and their sanitary problems overlooked by the State's agenda (Jesus, 2020). The concept of basic sanitation, promoted through the creation of the Liga Pró-Saneamento do Brasil (LPSB), was shaped by eugenic perceptions and principles, aiming to drive the country's modernization through health

initiatives. Sanitary sewage and water supply measures, and consequently quality of life improvements, were directed towards the white population, thereby perpetuating and intensifying racial inequalities (Cunha et al., 2018; Diwan, 2018; Kind et al., 2020).

In this new scenario, Black people had their homes destroyed and were forced to move to other locations with even worse sanitary conditions, such as hills and slopes, which lacked basic hygiene facilities, leaving them to live in unsanitary conditions without state intervention to address the issues they faced (Borret et al., 2020). Furthermore, a social perception was created that these areas now occupied by the Black population were promiscuous, dangerous, and dirty, reinforcing the racist notion that Brazilian society should distance itself from these environments (Seyferth, 2018).

This historical background gave rise to urban socio-spatial segregation, which is evident in the social context and in the division of inhabited spaces in Brazil. The population presenting certain social indicators, such as lower income, is directed to occupy inadequate areas, while another portion of the population with better financial conditions settles in places that benefit from greater state investment in security, health, transportation, and other factors that ensure a higher quality of life (Borja et al., 2015).

According to a study published by IBGE (Brazilian Institute of Geography and Statistics), there was a significant increase in the number of substandard housing clusters, which are characterized by precarious basic sanitation infrastructure. The number rose from 6,329 in 323 municipalities to 13,151 in 743 municipalities between 2010 and 2019, highlighting the growing inequalities in Brazil (IBGE, 2019).

Environmental Racism:

The concept of environmental racism was first used in 1981 in the United States, where a study highlighted the concentration of toxic products in the environment in poorer areas, predominantly occupied by the Black population (Roberts & Toffolon-Weiss, 2004). Since then, the term has been used to refer to actions carried out by public or private entities that generate environmental hazards, thereby creating negative impacts on the living conditions and quality of life of a marginalized ethnic group (Bullard, 2005). The understanding of the term also encompasses the idea of the invisibility of these environmental issues, affecting minorities in relation to the State, which, in turn, contributes to the perpetuation of these disparities (Jesus, 2020).

The logic of environmental racism also includes the adversities experienced due to the presence of inadequate basic sanitation in the environment (Gonçalves & Silva, 2020). The difficulty of accessing potable water, the consumption of contaminated food, the lack of sewage systems, and the absence of waste collection services are challenges that significantly alter the well-being of populations in certain locations (Bullard, 2005). The consequences generated by this deficient sanitation infrastructure, such as the presence of vectors transmitting diseases associated with inadequate basic sanitation, are also impacts of environmental racism, adversely affecting the health of the population in these areas (Pereira et al., 2018).

The Black population is directly impacted by environmental racism, as they have historically been forced to live in environments harmful to their health, being left without public policy support to modify the adverse environmental characteristics (Gonçalves & Silva, 2020). Additionally, the racially unequal income distribution in Brazil, where Black people represent 75% of the poorest and white people are among the 70% richest in the country, according to IBGE in 2018, further perpetuates the confinement of Black populations to marginalized areas that accumulate harmful and unpleasant factors, resulting in health inequities (Silva, Moraes & Santos, 2020).

The COVID-19 syndemic, which began in 2020, highlighted the nature of environmental racism due to the lack of basic sanitation in peripheral communities in Brazil, predominantly occupied by the Black and poor population (Reges, 2021). The precariousness of this service placed this population at greater risk due to the lack of water supply in certain areas, hindering the ability to perform handwashing, which was considered one of the most recommended measures to reduce the contamination and spread of the virus (Reges, 2021). In this context, a higher concentration of morbidity and mortality was observed in these environments, where the capacity to implement protective measures was more limited (Santos & Vargas, 2020).

Researchers indicate that people living in inadequate and precarious housing—representing approximately 60% of the Brazilian population—are at greater risk of contracting COVID-19 (IPEA, 2021). A report by the Organization for Economic Cooperation and Development (OECD) in 2021 showed that the Black population in Brazil has 1.5 times higher mortality risk from the disease due to their exposure to various vulnerabilities, including inadequate housing, demonstrating that the impact on populations in social vulnerability is significantly higher.

DRSAI and the Black Population

Diseases Related to Inadequate Environmental Sanitation (DRSAI) are examples of diseases that have a higher prevalence in the Black population and are defined as illnesses associated with deficiencies in water supply, waste collection, sewage systems, inadequate housing construction, and other issues that place individuals in a vulnerable position due to irregular sanitation, leading to illness and death (Veiga, 2021). These are infectious and contagious diseases that have a significant impact on the epidemiological indicators of public health in the country and contribute to overburdening the Unified Health System (SUS) (Pimentel et al., 2020). Leptospirosis, dengue, malaria,

Chagas disease, taeniasis, and helminthiasis are some examples of DRSAI (Pimentel et al., 2020).

Due to the disparities in the distribution of basic sanitation services in Brazil, researchers have observed the occurrence and persistence of deficits in this sector in areas of extreme poverty, which are home to populations facing social, economic, and cultural vulnerabilities (Rutkovski, 2019). According to the Brazilian Institute of Geography and Statistics (IBGE, 2020), the average income of people with access to sanitation is 3,054.10 reais per month, compared to 519.42 reais per month for those without. Educational attainment is another factor influenced by sanitation, with the average years of formal education being 9.76 years for individuals with access to sanitation services, compared to only 5.65 years for those without (IBGE, 2020).

The historical and social development of spaces occupied by the Black population in Brazil has subjected them to various vulnerabilities and limited access to public policies that ensure health and well-being (Werneck, 2016). As a result, several diseases have disproportionately affected the Black population, as the lack of socioeconomic investments to provide access to health services for these individuals has been systematically denied (Williams & Priest, 2015).

The presence of DRSAI in the Black population has been evident since the colonial period in Brazil, and currently, the continued high rates of morbidity and mortality from these diseases are observed among these individuals (Veiga, 2021). A study by Jesus (2020) showed that from 1996 to 2014, 55% of the 213,087 deaths caused by DRSAI were among Black people. Considering that 23% of cases did not have racial identification, this number could be even higher, especially if we consider the historical suppression of health data related to the Black population. According to this study, it was found that every hour and a half, one Black person dies due to a lack of basic sanitation in Brazil.

The deficiencies in basic sanitation also affect Black children at a higher rate, contributing to the increase in infant mortality rates (Rutkovski, 2019). A study conducted using FIOCRUZ (Oswaldo Cruz Foundation) databases from 2012 to 2018 showed that diarrhea and malnutrition are among the leading causes of death in children under five years old. This research also showed that 72% of these deaths are more frequent in Black children compared to white children. Furthermore, mortality rates are even higher among Indigenous children, with a difference of 1,300% (Rebouças et al., 2022).

Another study demonstrating the greater vulnerability of the Black population concerning basic sanitation shows that the risk of this population contracting infectious and parasitic diseases is 28.78%, compared to 16.11% for the white population (Barbosa, Aiquoc & Souza, 2021). Regarding arboviruses such as Zika, Dengue, and Chikungunya, there is still no concrete data on the epidemiology of these diseases according to race/color. However, studies report a higher occurrence of microcephaly associated with the Zika virus in Black newborns, where 8 out of every 10 affected babies are born to Black mothers (Barbosa, Aiquoc & Souza, 2021).

Current Status of Access to Basic Sanitation Services:

The struggle of the Black movement for inclusion in the health sector reached its peak in the second half of the 20th century (Silva et al., 2020), initially led by Black women, with an urgent focus aimed at drawing the attention of the state to the lack of access to public health policies for this population. After years of activism, the National Policy for the Comprehensive Health of the Black Population (PNSIPN) was established in 2009, with the purpose of addressing and tackling issues that hinder the Black population's access to the right to health (Oliveira et al., 2022).

The PNSIPN was instituted to implement strategic actions for the prevention, treatment, and recovery of diseases affecting the Black population, developing policies at the municipal, state, and federal levels, based on the understanding that these individuals are more exposed to health issues due to the construction and perpetuation of racial inequality in Brazil (Oliveira et al., 2022). Moreover, in 2017, after years of mobilization, the Ministry of Health made it mandatory to collect race/ethnicity data universally across the SUS (Unified Health System), recognizing the importance of such data to change the health landscape for Black people (Borret et al., 2021).

The actions of the PNSIPN also involve creating strategies to address the issue of basic sanitation deficits and their consequences for the Black population, as this problem exacerbates illness and mortality rates while overburdening the SUS with hospitalizations and expenses related to neglected diseases, in which Black individuals represent the group with the highest mortality rates from preventable diseases (Jesus, 2020).

Currently, 80% of the Brazilian population relies on the SUS, with 67% of these individuals being Black, accounting for 76% of consultations and 81% of hospitalizations in the system (MATOS, 2018). According to IBGE data from 2010, 54% of the Brazilian population, more than half, self-identified as parda (mixed-race) or Black. These numbers highlight the need for health issues related to this demographic to be closely monitored, strengthening public policies targeted at this racial group, as they represent the majority of the population and comprise those who use the SUS the most (Borret et al., 2020).

The failure in the implementation of the PNSIPN at the municipal level in Brazil is a significant current debate, as it was found in 2019 that only 57 Brazilian municipalities operate with the presence of this political project, revealing the inefficiency and negligence of the state in the process of universalizing these actions, even after 10 years of the established commitment (Silva & Lima, 2021). Barbosa and collaborators (2021) emphasize that in addition to the logistical difficulties in developing these actions, many health professionals are unaware of the purpose, importance, and specificities of these strategies for improving the

health of the Black population. Thus, institutional racism becomes evident, characterized by the persistence of inequalities perpetuated by governmental structures, serving as a determining factor in hindering Black individuals' access to health actions through equity (Anunciação et al., 2022).

Table 2 shows the proportion of Black and white populations without access to basic sanitation services in Brazil, highlighting the ongoing racism and economic disparities, as this percentage is significantly higher among Black people.

Table 2. Black and white population without access to basic sanitation services in Brazil in 2019.

Basic sanitation services	Black population (%)	White population (%)
Waste collection	12,5	6,0
Water supply	17,9	11,5
Sewage system	42,8	26,5

Source: IBGE (2019)

The 2019 study on racial inequalities by color or race in Brazil, conducted by IBGE, reported that Indigenous and Asian populations were not represented due to the insufficient population size for research.

The Veterinarian as a Health Promoter

The Veterinarian, SUS, and One Health:

Veterinary Medicine was initially established as a profession exclusively within the agricultural field; however, with the creation of the SUS and the expansion of the concept of health, its scope of practice broadened, and in 1993, veterinarians were also recognized as healthcare professionals (Araújo, 2013; Lecca et al., 2019). The Federal Council of Veterinary Medicine (CFMV) and the National Health Council (CNS) developed an initiative that highlighted the various sectors in which veterinarians could contribute, ensuring their active and collaborative participation in maintaining the quality of life of entire communities (Souza, 2016).

From that moment forward, veterinarians could perform a variety of roles within the SUS, engaging in activities unique to the profession as well as in multidisciplinary areas that involve the collective work of all healthcare professionals, aiming for an integrated approach (Gonçalves, 2018). In this system, veterinarians can develop a wide range of health actions, including epidemiological, environmental, and sanitary surveillance, occupational health, technology and hygienic inspection of animal products, and animal health defense (Gomes, 2017). Moreover, they can participate in health planning and management, the development of public policies, projects, and programs, as well as in health education and public health research (Lerner & Bergs, 2015).

Within SUS, veterinarians are widely known for one of their most prominent roles related to the prevention and control of zoonoses, which have a significant economic impact, cause widespread illness in the population, and contribute to hospital overload (Benício, 2019). They also play an important role in promoting sanitation, where through their expertise, they can carry out activities aimed at raising awareness about basic sanitation, seeking to improve living conditions and the quality of life of the population (Muniz et al., 2021).

Given the broad utilization of veterinarians in health initiatives, the concept of One Health began to emerge in the 1990s, gaining more traction and studies in the 21st century in Brazil (Araújo, 2013). This concept is characterized by the promotion of health for humans, animals, and the environment, based on the understanding that all three are interconnected and must be cared for to maintain the well-being of society (Benício, 2019). Interdisciplinarity is one of the key foundations of the term, where it is believed that only through collaborative actions involving various professionals in society—such as veterinarians, sociologists, environmentalists, economists, and others—can access to this system be constructed with equity (Gibbs, 2014).

According to Kingsley and Taylor (2017), One Health cannot be interpreted solely from a technicist perspective, as its approach must encompass broad discussions on socioeconomic, cultural, and political issues that also influence health promotion for the population. The collaboration of all professionals allows for data collection and analysis to be conducted more sensitively, addressing the needs and urgencies of society, as well as prioritizing groups of individuals who are more exposed to risk factors than others, thereby enabling the development and growth of the country (Mardones et al., 2017).

The large number of zoonotic pathogens circulating on the planet already highlights the importance of veterinarians in controlling and preventing these diseases and their contribution to human health, as well as attention to the environment (Muniz et al., 2021). However, their responsibilities are not limited to that; veterinarians also play key roles in food safety and security, antimicrobial resistance, vaccine production, human-animal relationships, environmental conservation and sustainability, the sociology and economics of health, climate change, and more (Lerner & Bergs, 2015). All of these roles allow veterinarians to create strategies for preventing health problems and ensuring universal healthcare (Lecca et al., 2019).

Environmental Health Surveillance and Basic Sanitation:

Environmental health surveillance is a set of actions and services that provides the knowledge and detection of any changes in the environmental determinants and conditions that impact human health, aiming to identify preventive and control measures for environmental risk factors related to diseases or other health hazards (Brasil, 2002). Still considered a new field, regulated in 2001, it aims to promote an understanding of environmental changes that affect human health in order to control and prevent environmental risks mainly arising from vectors, reservoirs, hosts, venomous animals, water for human consumption, air,

soil, environmental contaminants, natural disasters, and accidents involving hazardous substances (Franco & Carneiro, 2002).

Veterinarians possess the knowledge required to perform environmental health surveillance activities, particularly in the context of basic sanitation, as human well-being depends on adequate environmental factors (Gomes, 2017). Through this role, veterinarians work to control risk factors related to inefficient sewage systems, waste collection, and the supply and quality of drinking water, thereby contributing to reducing the transmission of diseases through vectors and the consumption of food contaminated by unsuitable environmental conditions during production and consumption (Silveira & Campos, 2022). In this way, veterinarians contribute to ensuring dignified and adequate housing for the population residing in a given locality (Nicácio & Júnior, 2019).

Effective action in environmental health surveillance requires veterinarians to engage with current social issues, as it is known that after the intense processes of urbanization and industrialization in cities, there has been a persistent inadequacy of basic sanitation services for social groups living in marginalized and peripheral areas, with precarious housing conditions and poor health indicators (HELLER, 1997). Thus, veterinarians must organize their action strategies in conjunction with social movements and the community to build interventions that reduce risk factors for morbidity and mortality in those populations through a healthier relationship with the environment (Nicácio & Júnior, 2019).

Another important aspect of the veterinarian's role in the process of reducing risk factors is the development of health education, especially in poorer areas (Rodrigues et al., 2017). Through this approach, it is possible to inform and raise awareness within the community about practices that contribute to maintaining the quality of life in a given area, through actions that can be implemented via programs that involve the community in the healthier construction of the environment (Rodrigues et al., 2017).

Epidemiological Surveillance, Zoonoses, and DRSAI

Epidemiological surveillance is associated with the development of actions aimed at studying information about diseases obtained through data collection and analysis, with the goal of devising strategies for their control, prevention, and reduction of health issues (Guimarães et al., 2010). The acquired knowledge should be disseminated according to its necessity and relevance, as it can constitute a reliable and transparent source for constructing strategies to combat a specific disease (Tavares, 1994).

Currently, it is known that there are more than 200 types of recognized zoonotic diseases, which account for 75% of emerging and re-emerging infectious diseases in humans and 60% of all human infectious diseases (Lecca et al., 2019). According to data from 2006 to 2010, these zoonoses represent 40% of the Compulsory Notification Disease List and are considered the most impactful in Brazil. Among them are yellow fever, hepatitis B, dengue, Chagas disease, schistosomiasis, and others (Brasil, 2017).

As a result, veterinarians play a crucial role in reducing these numbers, as their knowledge of epidemiology and related diseases enables them to integrate their expertise into public services and carry out actions to establish universal health coverage (Oliveira et al., 2017). This professional has extensive training in handling hosts and diseases with zoonotic potential, allowing their involvement in epidemiological surveillance not only through public agencies but also in veterinary clinics, the field, laboratories, and other locations. This demonstrates that the development of control measures can only be achieved through collaborative efforts with various sectors (Guimarães et al., 2010).

Some Diseases Related to Inadequate Environmental Sanitation (DRSAI) constitute significant zoonoses in Brazil, which occur due to environmental changes and pose health risks to the population (Rodrigues et al., 2017). The deficiency in basic sanitation creates a favorable environment for the development of endemic diseases that contribute to the illness of entire communities (Tassinari et al., 2004). The Zoonosis Control Center (CCZ) serves as an aid to Public Health agencies in combating zoonoses by offering multiprofessional programs aimed at meeting community needs within a short period of time. This institution can operate in the laboratory diagnosis of animal and human diseases, research and control of zoonoses, vector management, and other functions, thus contributing to epidemiological surveillance (Barroso & Lima, 2012).

The use of epidemiological indicators also serves as an important tool to strengthen epidemiological surveillance, as it allows for the assessment of health conditions within a given community, identifying specific issues (Costa et al., 2005). Moreover, these indicators enable the identification of human profiles at higher risk of contracting diseases, through their distribution by age group, race/color, gender, income, and other variables, thereby supporting the achievement of health service goals and actions (Costa et al., 2005).

NASF, Public Policies, and the Black Population

The Family Health Support Center (NASF) was created in 2008 as a support tool for the Family Health Strategy (ESF), aiming to expand and strengthen the actions developed by Primary Care (AB) within the SUS (Unified Health System) (Brasil, 2008). Its actions are guided by some of the AB's principles, which employ multidisciplinary and intersectoral collaboration for the development of health promotion with community participation and a humanized approach to care (Brasil, 2008). NASF professionals must be committed to continuous learning, integrating their activities with other professionals and including community engagement as well as territorial knowledge of their area of responsibility (Pedro, 2021).

Veterinarians were only included in the NASF professional team in 2011, being recognized as important actors in the context of public health, performing various roles, including administrative activities in the programs proposed by the center (Brasil, 2011). These professionals can plan and carry out socio-educational activities in the territory, conduct home visits, research, prevention, and diagnosis in health, monitor the program's

progress and obstacles, in addition to their important role related to the human-animal-environment interface, where their expertise enables a broad understanding of the factors that impact human health (Pedro, 2021).

The development of municipal public policies is also part of the duties of veterinarians working within the NASF team, which involves providing goods or services to the population through specific programs (Ziech & Vacovski, 2018). In this center, veterinarians can develop health programs focusing on the study of socio-environmental risk factors and zoonotic diseases within a territory, as well as identifying vulnerability indicators that expose the population to these issues, thereby creating prevention interventions to reduce such health threats (Ziech & Vacovski, 2018).

The Family Health Strategy (ESF) aims to consolidate and reorganize Primary Care (AB) or Primary Health Care (APS) throughout the national territory through health actions that address the individual, collective, and family needs of a given community, being considered the main entry point to the SUS (Molin et al., 2015). This entity is responsible for implementing policies and actions aimed at achieving health equity, which is considered one of the pillars of the SUS. It requires a restructuring of service delivery, as social and health inequalities have historically placed some individuals in situations of greater vulnerability (Morosini et al., 2018).

In this context, the black population is assisted within the scope proposed by APS and consequently by the ESF and NASF, as historically marginalized and vulnerable individuals in health initiatives, thus needing an expansion of their access to this sector (Ferreira, 2022). The National Policy for Comprehensive Health of the Black Population (PNSIPN) is integrated within the SUS at the three levels of government, with shared management and actions, developing strategies to strengthen the use of the race/color category in epidemiological research and its implications, combating institutional racism within health systems, and promoting the participation of the black population in building health strategies (Santos, 2021). Other characteristics include the creation of affirmative actions for equity and proper professional training (Santos, 2021).

Health education through initiatives developed by Primary Health Care (APS) for the black population was a key aspect in the agenda of the PNSIPN, which aimed at reducing mortality from preventable diseases in Brazil through programs that worked jointly with the community to promote health (Ferreira, 2022). According to Hone et al. (2017), the activities carried out by the ESF resulted in a 27.5% reduction in deaths from infectious diseases among black individuals and a 17.9% decrease in mortality in black children under 5 years old due to anemia and nutritional deficiencies, demonstrating a positive impact of educational interventions on health practices.

Current Context of the Veterinarian's Role in Health

Currently, veterinarians are recognized as public health professionals worldwide, being seen as essential for various health actions (Gomes, 2017). However, in Brazil, there are still limitations and a lack of information regarding their competencies within the SUS. During their academic training, veterinary students experience a learning deficit in this area, either due to the limited hours allocated to this curricular component or the lack of subjects addressing the study of health activities performed by these professionals (Pfuetzenreiter & Zylbersztajn, 2008).

A study conducted by Pfuetzenreiter and Zylbersztajn (2004) analyzed the 9 main Veterinary Medicine programs in Brazil and highlighted disparities in the course curricula, which were divided into 4 areas: (1) Veterinary Clinical Practice, (2) Preventive Veterinary Medicine and Public Health, (3) Animal Science and Production, and (4) Basic Subjects. Table 3 presents the results of the study, highlighting that area 3 had the lowest number of course hours.

Table 3. Profile of the Curriculum Structure of the Main Veterinary Medicine Courses in 2004.

Areas	Curriculum (%)
Veterinary Clinical Practice	32,62%
Preventive Veterinary Medicine and Public Health	11,64%
Animal Science and Production	17,96%
Basic Subjects	27,42%

Source: Adapted from Pfuetzenreiter & Zylbersztajn.

Due to this scenario, the training of veterinarians often becomes limited regarding specific segments, hindering the development of professionals who understand the competencies and the importance of their presence in carrying out One Health actions and in the SUS, addressing the socioeconomic and environmental issues throughout the country (Burger, 2010).

An additional aspect is the lack of knowledge among ESF teams about the relevance of veterinarians working within NASF, making it difficult to expand this service throughout Brazil (Araújo, 2013). Currently, there are 4,320 NASFs implemented in 3,400 municipalities, with the presence of 114 veterinarians, Maranhão being the state with the highest number of these professionals, with 19 veterinarians (Ziech & Vacovski, 2018).

CONCLUSION

The provision of basic sanitation in Brazil for the Black population is insufficient and generates several impacts on their health processes, making them more susceptible to certain diseases arising from this environment. Furthermore, the lack of dignity in areas without proper sanitation infrastructure perpetuates the maintenance of racism in the country, a social problem that has evolved over the years, assuming various forms to continue the marginalization and restriction of Black people as Brazilian citizens.

Veterinarians working within the SUS must engage in health actions aimed at building a more equitable society, focusing on mitigating the effects that racial inequalities produce in these

contexts. Combating institutional racism and ensuring the right of the Black population to access health services without constraint or exclusion, based on the PNSIPN, should be the duty of every professional working in public institutions. Likewise, this professional must also develop environmental and epidemiological surveillance actions that reduce the impacts caused by the deficit in basic sanitation services for the Black population.

Through NASF, veterinarians can contribute to One Health structures by developing programs that support ESF in its potential to reduce health problems for the Black population, strengthening preventive health actions in the territories. In this way, they can help reduce the morbidity and mortality rates of these individuals, who historically have shown significantly higher rates of diseases related to poor sanitation (DRSAIs).

The veterinary training process during undergraduate studies must also be aligned with the principles and guidelines of the SUS, where Brazilian veterinary schools bear the responsibility of offering content that addresses these aspects, contributing to the development of professionals who are aware and responsible for the health conditions in their country. Furthermore, these professionals should have the knowledge of interventions and changes that their work can implement to improve the living conditions of the population.

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