Review Article

Infectious Diseases, Social, Economic and Political Crises, Anthropogenic Disasters and Beyond: Venezuela 2019 – Implications for Public Health and Travel Medicine◊

José A. Suárez,[1,2] Lolimar Carreño,[3] Alberto E. Paniz-Mondolfi,[2,4,5,6] Francisco J. Marco-Canosa,[7] Héctor Freilij,[8] Jorge A. Riera,[9] Alejandro Risquez,[2,10,11] Andrea G. Rodriguez-Morales,[12] Evimar Hernández-Rincón,[13] Jorge Alvarado-Socarras,[14] Gustavo Contreras,[15] Maritza Cabrera,[16] Rosa M. Navas,[17] Fredi Diaz-Quijano,[18] Tamara Rosales,[19] Rosa A. Barbella-Aponte,[20] Wilmer E. Villamil-Gómez,[2,21,22] Marietta Díaz,[23] Yenddy Carrero,[24] Anishmenia Pineda,[25] Nereida Valero-Cedeño,[26] Cesar Cuadra-Sánchez,[27] Yohama Caraballo-Arias,[11,28] Belkis J. Menoni-Blanco,[29,30] Giovanni Provenza,[31] Jesús E. Robles,[32] María Triolo-Mieses,[23,33] Eduardo Savio-Larriera,[34] Sergio Cimerman,[35] Ricardo J. Bello,[36] Carlos Franco-Paredes,[37,38] Juliana Buitrago,[39,40] Marlen Martinez-Gutierrez,[41] Julio Maquera-Afaray,[42] Marco A. Solarte-Portilla,[43] Sebastián Hernández-Botero,[44,45] Krisell Contreras,[46,47] Jaime A. Cardona-Ospina,[48,49,50,51] D. Katterine Bonilla-Aldana,[49,52] Alfonso J. Rodriguez-Morales.[2,10,49,53,]*

[1]*Investigador SNI Senacyt Panamá, Clinical Research Department, Instituto Conmemorativo Gorgas de Estudios de la Salud, Panama City, Panama.*
[2]*Committe on Travel Medicine, Pan-American Association of Infectious Diseases (API), Panama City, Panama.*
[3]*Colsubsidios, Bogotá, DC, Colombia.*
[4]*Infectious Diseases Research Branch, Venezuelan Science Incubator and the Zoonosis and Emerging Pathogens Regional Collaborative Network, Cabudare, 3023, Lara, Venezuela.*
[5]*Laboratorio de Señalización Celular y Bioquímica de Parásitos, Instituto de Estudios Avanzados (IDEA), Caracas, Caracas, Venezuela.*
[6]*Academia Nacional de Medicina, Caracas, Venezuela.*
[7]*Internal Medicine, Cleveland Clinic Foundation, Cleveland, OH, USA.*
[8]*Parasitology and Chagas Service, Buenos Aires Children Hospital Ricardo Gutiérrez, Capital Federal, Buenos Aires, Argentina.*
[9]*Hospital de San Fernando, Ministerio de Salud, San Fernando, VI Region, Chile.*
[10]*Latin American Society for Travel Medicine (SLAMVI), Buenos Aires, Argentina.*
[11]*Faculty of Medicine, Universidad Central de Venezuela, Caracas, Venezuela.*
[12]*Centro de Referencia de Salud Dr. Salvador Allende Gossens, Santiago de Chile, Chile.*
[13]*PediCentro, Barrancabermeja, Santander, Colombia.*
[14]*Fundacion Cardiovascular de Colombia, Floridablanca, Colombia.*
[15]*Universidad Industrial de Santander, Bucaramanga, Colombia.*
[16]*Vicerrectoría de Investigación y Postgrado (VRIP), Universidad Católica del Maule, Chile.*
[17]*Health Care Service, International Airport Camilo Daza, Cúcuta, Norte de Santander, Colombia.*
[18]*Departamento de Epidemiologia, Faculdade de Saúde Pública, Universidade de São Paulo, São Paulo, SP, Brasil.*
[19]*GSK, Quito, Ecuador.*
(affiliations continue next page)

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Abstract

During the last months, there has been a significant increase in the evidence showing the catastrophic health situation in Venezuela. There are multiple epidemics, increase in emerging and reemerging infectious, tropical and parasitic diseases as consequences of the social, economic and political crises, which would be considered today an anthropogenic disaster. Venezuela is facing in 2019, the worse sanitary conditions, with multiple implications for public health and travel medicine. So far, from a global perspective, this situation will be an impediment for the achievement of sustainable development goals (SDG) in 2030. In this multiauthor review, there is a comprehensive analysis of the situation for infectious diseases, non-communicable diseases, their impact in the Americas region, given the migration crisis as well as the relative status of the SDG 2030. This discussion can provide input for prioritizing emerging health problems and establish a future agenda.

Key words: Infectious diseases, tropical diseases, epidemics, parasitic diseases, syndemics, sustainable development goals, anthropogenic disaster, political crisis, migratory crisis, Venezuela.

[20]*Servicio de Anatomía Patológica, Complejo Hospitalario Universitario de Albacete, Facultad de Medicina Universidad Castilla La Mancha, Albacete, Spain.*
[21]*Infectious Diseases and Infection Control Research Group, Hospital Universitario de Sincelejo, Sincelejo, Sucre, Colombia.*
[22]*Programa del Doctorado de Medicina Tropical, Universidad del Atlántico, Barranquilla, Colombia.*
[23]*Clinical Department, Escuela de Bioanálisis, Faculty of Health Sciences, Universidad de Carabobo, Valencia, Venezuela.*
[24]*Universidad Técnica de Ambato, Ambato, Ecuador.*
[25]*Clinique Les Hauts d'Anieres, Geneva, Switzerland.*
[26]*Universidad Estatal del Sur de Manabí, Cantón Jipijapa, Ecuador.*
[27]*Universidad Nacional Autónoma de Nicaragua (UNAN), Managua, Nicaragua.*
[28]*ICOH National Secretary, Caracas, Venezuela.*
[29]*Consultorio Médico de Especialidades, Montevideo, Uruguay.*
[30]*Capítulo Merideño, Sociedad Venezolana de Medicina Interna, Mérida, Venezuela.*
[31]*Hospital Universitario Fundación Jiménez Diaz, Madrid, Spain.*
[32]*Universidad Católica Santa María la Antigua, Panama city, Panama.*
[33]*Laboratorio de Neurociencias, Facultad de Medicina, Pontificia Universidad Católica de Chile, Santiago de Chile, Chile.*
[34]*Hospital Evangélico de Montevideo, Montevideo, Uruguay.*
[35]*Institute of Infectious Diseases 'Emilio Ribas', São Paulo, Brazil.*
[36]*Department of Surgery, Johns Hopkins University School of Medicine, Baltimore, MD, USA.*
[37]*Division of Infectious Diseases, Department of Medicine, University of Colorado Anschutz Medical Center, Aurora CO, USA.*
[38]*Hospital Infantil de México, Federico Gómez, México City, México.*
[39]*Colombiana de Trasplantes, Sede Rionegro, Antioquia, Colombia.*
[40]*Surgery Area, Faculty of Health Sciences, Universidad Tecnológica de Pereira, Pereira, Colombia.*
[41]*Grupo de Investigación en Ciencias Animales-GRICA, Universidad Cooperativa de Colombia, Calle 30A #, 33-51, Bucaramanga, Colombia*
[42]*Infectious Diseases Division, Instituto Nacional de Salud del Niño San Borja, Lima, Peru.*
[43]*Hospital Universitario Departamental de Nariño, Pasto, Nariño, Colombia*
[44]*Coordination of Microbiology, School of Medicine, Universidad de Manizales, Manizales, Caldas, Colombia.*
[45]*Grupo de Resistencia Antibiótica de Manizales (GRAM), Manizales, Caldas, Colombia.*
[46]*Clínica San José, Cúcuta, Norte de Santander, Colombia.*
[47]*Hospital Universitario Erasmo Meoz, Cúcuta, Norte de Santander, Colombia.*
[48]*Grupo de Investigación Biomedicina, Fundación Universitaria Autónoma de las Américas, Pereira, Risaralda, 660004, Colombia.*
[49]*Public Health and Infection Research Group, Faculty of Health Sciences, Universidad Tecnológica de Pereira, Pereira, Risaralda, Colombia.*
[50]*Grupo de Investigación Infección e Inmunidad, Faculty of Health Sciences, Universidad Tecnológica de Pereira, Pereira, Risaralda, Colombia.*
[51]*Grupo de Investigación en Enfermedades Emergentes y Medicina Tropical, Instituto para la Investigación en Ciencias Biomédicas – Sci-Help, Pereira, Risaralda, Colombia.*
[52]*Grupo de Investigación en Ciencias Animales (GISCA), Fundación Universitaria Autónoma de las Américas, Pereira, Risaralda, 660004, Colombia.*
[53]*Editor-in-Chief, Revista Panamericana de Enfermedades Infecciosas, Asociación Panamericana de Infectología.*

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Introduction

Over the last two decades, many Venezuelan citizens have suffered a drastic reduction in their standard of living, and overall health and quality of life [1-5]. The ongoing political, social and economic crises have exponentially accelerated as multiple scientific reports, and media outlet has recently illustrated in the last few months [6].

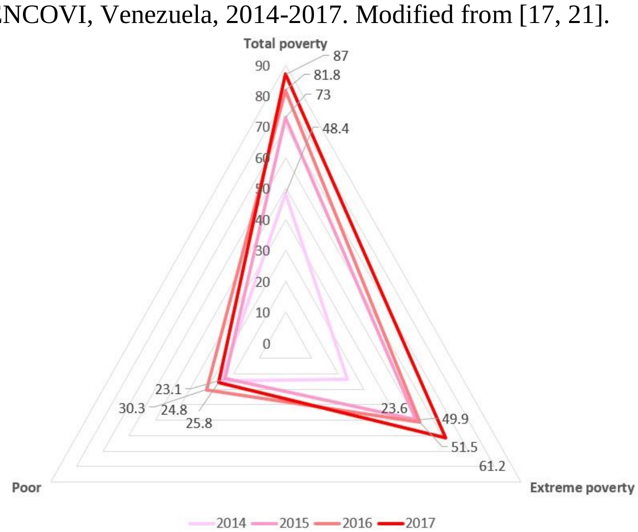
The impact of this humanitarian crisis has led to significant social injustices including health inequities and enabled downward social mobility of already marginalized and impoverished populations [4, 5, 7-16]. According to different estimates, by the end of 2018 and the beginning of 2019, more than 4 million impoverished Venezuelans have crossed international borders by air, land, and in some cases by sea and even by foot, carrying a couple of suitcases with their most personal belongings. In August 2018, the International Organization for Migration (IOM), said: "This is building to a crisis moment that we have seen in other parts of the world, particularly in the Mediterranean" [17].

Newspapers as well as non-governmental organizations (NGO), all around the world, claim this is the largest migration crisis in the history of Latin America escaping the increasing disparities and low standard of living conditions [7, 9]. By the end of 2019, the number of Venezuelan migrants will reach the 6 million mark [18]. In fact, some international organizations, such as the Food and Agriculture Organization of the United Nations and the European Commission have defined the situation of Venezuela as a “complex crisis”, which not only includes political and socio-economic topics but also affects health and food security, related to a poor accessibility and availability to food [19].

Undeniably, as explained in detail later, the political actions of the last two governments in the country have led to the profound economic, political, food security and social crisis with a high impact in health. Even, members of Cuba’s medical missions to Venezuela —a signature element of relations between the two countries— described a system of deliberate political manipulation in which their services were wielded to secure votes for the governing Socialist Party, often through coercion, according to the New York Times [20].

Growing poverty levels, according to the National Survey of Living Conditions [ENCOVI] 2016, using the multidimensional poverty index, the proportion of households living in poverty increased reaching 46% in 2016, being higher outside the capital city Caracas, [21], and leading between 2014 to 2017 to a significant increase especially in total poverty (87%) and extreme poverty indexes (61.2%) (Figure 1) [17, 21].

Figure 1. Poverty by the level of income, according to ENCOVI, Venezuela, 2014-2017. Modified from [17, 21].



Also, food insecurity (for 2016, according to ENCOVI, 32.5% of the people had two or fewer foods per day, 39.8 among those considered in extreme poverty) [21], and escalating violence are the driving forces underlying the massive exodus across the Venezuelan borders. The already precarious public health infrastructure (presence of stray pets in health centers, rusty stretchers, leaking ceilings, lack of cleaning products in hospitals and poor sanitary disposal) combined with a collapsed healthcare systems failure have resulted in a double burden of disease characterized by the resurgence of previously controlled infectious diseases [22, 23], and multiple simultaneous epidemics (syndemics) [8].

Additionally, food shortages have resulted in unprecedented degrees of malnutrition [22, 23]. Failure of the social security institutions along with the deterioration of the rule of law has led to dramatic increases in violent crime such as homicide, armed robbery, kidnapping, and carjacking [2, 24, 25]. Throughout the country, impoverished and marginalized Venezuelans often experience power outages, water shortages and limited availability of essential medications and medical supplies [23].

The global perception of the civil strife and the prevailing insecurity in Venezuela prompted the U.S. Centers for Disease Control and Prevention (CDC) to issue a warning Level 3 for international travelers to avoid non-essential travel to Venezuela since May 2018 [26]. Furthermore, the Venezuelan government restricts access to U.S. consular services for individuals with double nationality (U.S. and Venezuelan), and on March 2019 the U.S. Embassy in Caracas closed all its services, and all the diplomatic personnel was withdrawn and sent back to the USA.

Residents of Caracas and another major Venezuelan cities recently experienced a seven-day-long power outage and limited water supply that further hampered sanitation efforts enabling the spread of infectious pathogens [27, 28]. Therefore, at this time, international travelers entering Venezuela during essential trips need to seek detailed pre-travel advice as well as to register at their country consulate at the time of entry to receive specific safety and security recommendations.

It is difficult to estimate the magnitude of the health problem associated with migration, as well as to recognize the mechanisms involved. Due to the growing volume of migrants, we still do not have yet enough reliable denominators to estimate the risk of each disease among migrants in the receiving countries.

For these reasons, the increase in health events in Venezuelan migrants is restricted to the perspective of the provision of services and surveillance systems.

Consequently, it should be noted that the rise in each of the health problems identified in migrants would be the result of one or more of the following phenomena:

A) The expected increase due to the brute migratory population growth, which would be related to the demographic structure of the population that enters the country. For example, the migration of older adults will lead to an increase in the demand for services for chronic disease care, without necessarily implying that this group has a higher risk than those of the same age in the receiving country.

B) The selective migration of groups with specific risk factors. For example, in the case that people who migrate have particular conditions, such as malnutrition or risk behavior, this group will contribute to an increase in cases higher than expected for their demographic characteristics.

C) The spread of emerging or reemerging health problems, originated or promoted in the country of origin (in this case Venezuela), related or not to the aforementioned socioeconomic crisis. For example, the importation of vaccine-preventable diseases from regions with low vaccination coverage.

At this time, we cannot determine which one or more of these three mechanisms predominate in the emergence of each one of the health problems identified among migrants. However, the purpose of this article is to review the events in which the representation of Venezuelan immigrants has increased and discuss possible explanations related to the humanitarian crisis of recent years.

An anthropogenic disaster

The humanitarian crisis in Venezuela is the result of poor governance stemming from failed social and economic policies [29]. Devalued appreciations of the moral and the political economy of human life have resulted in limited freedoms and opportunities for Venezuelan citizens. Providing medical care and attending to public health demands has become a significant commodity leading to unnecessary human suffering and substantial material and economic losses. The health needs of the population are currently unmet and far exceeding the existing capability, awareness, and response of the Venezuelan governmental institutions [29]. Once considered one of the richest countries in Latin America due to its oil reserves and mineral deposits, as well as tourist attractions, Venezuelan development indexes have dropped producing a major humanitarian crisis with catastrophic health implications including increased childhood mortality (63% increased only in 6 years from 2012-2018) [15]. A major health crisis has erupted resulting from a major breakdown in the provision of health services due to insufficient medical supplies and medications, the exodus of specialized physicians, poorly paid healthcare providers, and the fallout of healthcare institutions and infrastructure [29]. Also, in this context, natural disasters can be aggravated due to inertia or human wrongdoing.

No development is possible within this anthropogenic crisis, and it would be very difficult for Venezuela to reach the Sustainable Development Goals (SDG) in 2030, even if the group currently sitting in office left and the country transitioned to the interim government now recognized by most Western democracies. The SDGs are the blueprint for achieving a better and more sustainable future for all according to the United Nations Organization (UN) [30]. They address the global challenges we face, including those related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice.

For Venezuela, the time seems to be over. This nation is suffering consequences of two disruptive anthropic events, the first at a local scale, given by two decades of negligence in the management of resources, and the other, a global scale menace, related to effects of global warming due to human activity over the same time [31, 32]. Every day the crisis is happening without solutions, with undeniable consequences of the climate change that will be easier to notice every year, and the window time to repair Venezuela will be smaller year after year.

The SDGs interconnect, and in order to leave no one behind, it is important that we achieve each of them and target on time. There are 17 SDGs with 169 targets that all 191 United Nations Member States have agreed to try to achieve by the year 2030, including Venezuela. Health has a central place in SDG 3: Ensure healthy lives and promote well-being for all at all ages, underpinned by 13 targets that cover a wide spectrum of the World Health Organization (WHO) work [33]. However, almost all of the other 16 goals also related to health or will contribute to it, directly or indirectly. The new agenda, which builds on the Millennium Development Goals, aims to be relevant to all countries and focuses on improving equity to meet the needs of women, children and the poorest, most disadvantaged people. For the first time, extreme poverty is higher than non-extreme poverty; more than half of the country's population does not have enough income to meet their basic food needs (Figure 1) [17, 21].

There is no adequate public health or policy plan that guide the programs to deal with significant health issues and diseases, as is the case in the neighboring country Colombia (Figure 2), which is advancing with its National Plan of Public Health 2012-2021 of the

Ministry of Health, which especially considers communicable diseases [34].

Infectious Diseases

Malaria

Historically, Venezuela was a regional leader in the control of vaccine-preventable diseases and tropical diseases. For example, before 1936, Venezuela had the highest number of human malaria cases in Latin America, but due to major government-led public health initiatives, achieved malaria eradication in over 80% of endemic areas by 1960 [7, 8, 13, 35-42]. In the 1980s and extending into the 1990s there was a resurgence of malaria cases, but major control efforts were able to reach control levels of malaria transmission in most districts. Malaria was endemic to >600,000 km^2 (65.5%) of this country (from a total of 916,445), consequently leading to major population decreases from malaria deaths during this same period [43]. Additionally, the problem of resistant malaria is added in some states of Venezuela such as Bolivar [39]. Regretfully, in the last two decades, despite major scientific advances in the prevention, diagnosis, and treatment of malaria [44-46], there is an ongoing major malaria epidemic of unprecedented magnitude [14, 39]. Indeed, Venezuela has become the epicenter of an increasing number of malaria cases spreading to other countries including Colombia (Figure 2) and Brazil. In fact, in Colombia, more than 95% of imported cases of malaria are from Venezuela [7]. A lack of national vector-control efforts, insufficient supply of antimalarial medications, and poor access to healthcare fuels the burden of malaria in Venezuela.

Other tropical diseases

A similar situation takes place in many other major neglected tropical infections such as Chagas disease [47, 48], leishmaniasis [49-52], and tuberculosis (TB) [5, 53]. Once under control, today we see inoperative control programs and recurrent outbreaks in Venezuela. Trypanosoma cruzi infection has resurfaced as a pathogen causing important urban outbreaks, including those affecting the Venezuelan capital [48, 54, 55], but also in border areas with Colombia, including some fatal acute cases linked to oral transmission [47]. The urbanization-spreading phenomena of leishmaniasis have been recently reported [49]. In Barquisimeto and Cabudare, Lara state, this has been recently reported [50]. Previously, the flux of imported cases of leishmaniasis was from Colombia to Venezuela, following the migration from the first to the second in the 1980s and 1990s [56]. Currently, the opposite is true: according to the National Institute of Health of Colombia (www.ins.gov.co), during 2017 there were at least 43 imported cases of cutaneous leishmaniasis with 58% of them from Venezuela. In 2018, this number increased to 56, and 87.5% of them were from Venezuela (Table 1) [57]. A similar situation occurs with TB. In 2017, 65% of the 84 imported cases were from Venezuela. However, this number tripled by 2018 [57]. This number is expected to increase by 2019 since, by early March 2019, there are already 14 imported cases of TB from Venezuela (Table 1) [58].

Figure 2. Venezuelan migrants in Colombia.
A. People were making long lines for free meal centers in Cucuta, Norte de Santander (March 2019). **B.** Homeless or street people are asking for money in Pereira, Risaralda (March 2019). **C.** Improvised informal refugee camps in north Cali, Valle del Cauca (November 2018). The authors of this review article personally took all these photographs.

Today Venezuela is facing a complex group of factors similar to what happened in some former Soviet republics related to the expansion of multidrug-resistant TB (MDR-TB) in Eastern Europe [59]. Given the current migration crisis, today this would be possible for the Americas. Then, in countries such as Colombia, MDR-TB surveillance is necessary [60].

Recent studies have suggested that conventional methods are not enough, and new approaches are required [61, 62]. Also, Venezuelan migrants are moving to countries, such as Peru with a high prevalence of MDR-TB, even extensively drug-resistant TB (XDR-TB) with additional adverse social conditions in such countries [63].

Arboviral diseases

At this time, it is difficult to determine the overall impact of arboviral epidemics in Venezuela since there is limited government published epidemiological information and insufficient and ineffective surveillance programs. Alarmingly, morbidity and mortality derived from dengue and another arbovirosis on those most susceptible to deleterious outcomes, like children and pregnant patients, are also unknown and difficult to estimate [14, 64-66].

Dengue epidemics have even spilled over to distant parts of the world such as the Madeira islands of Portugal [67] since 2012 [68-71]. The National Institute of Health of Colombia (www.ins.gov.co) reported that during 2017 there were at least 49 imported cases of dengue and 31% of them from Venezuela. However, by 2018, more than 350 cases were imported cases from Venezuela with 3 cases of severe dengue (Table 1) [57]. So far, in early 2019, there are already 38 imported cases reported of which 29 (76%) are imported from Venezuela (Table 1) [58].

Table 1. Selected imported infectious diseases from Venezuela reported by the National Institute of Health (www.ins.gov.co) of Colombia, 2017-2019.

Imported Infectious Diseases		Years 2017	2018	2019*
Leishmaniasis	N	43	56	N/A
	n Venezuela	25	49	N/A
	%	**58.1**	**87.5**	N/A
Tuberculosis	N	84	220	N/A
	n Venezuela	55	200	N/A
	%	**65.5**	**90.9**	N/A
Dengue	N	49	383	38
	n Venezuela	15	355	29
	%	**30.6**	**92.7**	**76.3**
	% Severe	N/A	3.1	N/A
Pertussis	N	8	46	5
	n Venezuela	7	43	5
	%	**87.5**	**93.5**	**100.0**
Varicella	N	63	116	5
	n Venezuela	32	100	4
	%	**50.8**	**86.2**	**80.0**

*Till March 10, 2019. N/A, not available.

In recent years, the bordering Colombian departments of Norte de Santander (Figure 2), Cesar, and La Guajira have experienced dengue and other arboviral epidemics with important potential implications of becoming epicenters of new upcoming epidemics from imported Venezuelan cases [72-76]. In addition, a recent study undertaken in Zulia state revealed a deep spatial temporal analysis of dengue fever using a generalized additive mixed model with a set of climatic and non-climatic factors [77]. In this regard, the authors concluded that an urgent sanitary intervention is needed at a national scale, including georeferenced variables of dengue fever and relevant explanatory factors. Furthermore, the improvement on living conditions by ensuring water supply, electricity and garbage collection are essential to mitigate the sanitary chaos in accordance with those findings. Even more, the spillover to other distant countries of the region is possible, as occurred in Argentina in 2009-2010, with the detection of dengue serotype 1 in Buenos Aires, which was inferred mainly from Venezuela [78].

In Latin America, the epidemic of chikungunya of 2014 and Zika virus epidemic of 2015 reached Venezuelan territory [14]. The attack rate of chikungunya (CHIKV) at a national level was estimated between 7% and 14%, and the observed attack rate reached 40–50% of major populated urban areas. In 2014, Venezuela reported to the Pan American Health Organization (PAHO) a total of 30,405 cases of chikungunya (incidence of 112 per 100,000 population), 16,000 cases in 2015, 4,000 in 2016, and only 341 by 2017 [14, 79]. The first description of atypical and fulminant cases of chikungunya in Latin America occurred in Venezuela. Many of these patients experience a life-threatening, aggressive clinical course, with rapid deterioration and death due to multi-organ dysfunction syndrome [80, 81]. Imported cases of Chikungunya from Venezuela occurred in Italy [82] and Spain [83, 84] during 2015 and 2016. There are, however, no systematic studies to assess the incidence of post-CHIKV chronic disease (pCHIKV-CD) in Venezuela [85]. However, some estimates suggest that between 16,686 and 18,556 patients developed pCHIKV-CD in 2014 [85]. If we assume the rates of progression to pCHIKV-CD based on systematic reviews of pCHIKV-CD of global studies [86] approximately 40% of cases reported in Venezuela during the epidemic of CHIKV likely developed pCHIKV-CD (between 20,400 and 40,235 cases).

Additionally, there is no information available regarding congenital infection associated with CHIKV in Venezuela, despite its description in neighboring countries [87-89], including Colombia [90], even when this is expected to have occurred in the country.

Since 2015 health conditions of Venezuela, together with the tropical proliferation of different types of *Aedes* (*aegypti* and *albopictus*), suggest the arrival to this country of Zika virus. PAHO urges Latin American countries to take measures to prevent the Zika virus entry and advises that these measures must be designed to detect the introduction of Zika in an area, track its spread and actively monitor the disease.

In Venezuela where endemicity is high for other arboviruses such as dengue and chikungunya, the high incidence of cases due to those viral agents reflects weakened and poorly timed insensitive monitoring systems [91].

In January 2016, the Zika virus epidemic struck Venezuela at the same time as a rise in dengue virus transmission took place [14]. The incidence estimates of symptomatic cases during the peak of the epidemic (the first eight weeks of 2016) was 2,124 cases per 100,000 population [14]. According to PAHO, a total 67,294 of Zika cases in Venezuela occurred between 2015 and early 2019 (61,691 during 2016 for an incidence rate of 195.73 cases/100,000 population) [92]. There were limited research efforts in describing the epidemiology of Zika virus in Venezuela compared to neighboring countries (e.g., Brazil and Colombia) for the same period [93-100]. Zika virus epidemics in Venezuela led to imported cases to other countries such as the United States [101], and China [102]. In general terms, given the special attraction of Venezuela as a tourist destination, imported cases of infectious diseases even in distant countries have been reported in the last decades [103]. There are only a limited number of reports of Congenital Zika syndrome (CZS) in Venezuela [93, 94, 104, 105].

The Mayaro virus is an arbovirus that has once again become part of the epidemiological picture in Venezuela, together with Zika, chikungunya and dengue viruses. In 2016, the virus caused an epidemiological alert in several countries of Latin America after the Zika emergency [106]. In December 2018, due to the crisis in the health sector in Venezuela and the lack of official information on the cases, several organizations brought attention to a series of cases in Venezuela of a new disease that is similar to dengue and chikungunya fever in its early stage, (but without confirmatory laboratory results). Along with the history of cases of Mayaro fever in Brazil, there is a suspicion of a new incursion of Mayaro virus in the country. This shows, again, important failures in the surveillance system, which has lost its diagnostic and proactive characteristics, which contributes not only to the spread of diseases such as that caused by Mayaro virus but also of other documented diseases as malaria [13, 107].

In Venezuela, other risks of arboviral diseases are imminent and uncertain; for example, Oropouche virus is the aetiological agent of Oropouche fever, a zoonotic disease mainly transmitted by midges of the species *Culicoides paraensis*. Although the virus was discovered in 1955, more attention has been given recently to both the virus and the disease due to outbreaks of Oropouche fever in different areas of Brazil and Peru. Serological studies in human and wild mammals have also found Oropouche virus in Argentina, Bolivia, Colombia, and Ecuador [108]. Given the wide geographic distribution of the competent vector in America, there is a considerable risk of introduction of the Oropouche virus in countries with ecological characteristics suitable for its transmission, such as Venezuela. However, the similarity with other arboviral diseases and the insufficient and ineffective surveillance programs makes its real incidence unknown in this country [109].

Vaccine-preventable diseases (VPDs)

Decrease and lack of vaccination for most of the routine vaccine-preventable diseases (VPDs) are a matter of concern in Venezuela and beyond. Most authors concord in that there is a general resurgence of VPDs in the country [5, 8, 11]. There are some of them in epidemic situation persisting for over four years [110], e.g., diphtheria, affecting not only children in urban but also in rural settings, including Amerindian populations [111]. Measles, mumps, pertussis, tetanus, also, have been reported on raise [5, 8, 11]. Specially measles, which until March 2019 counts with 9,116 suspected cases (1,307 in 2017 and 7,809 in 2018), including 6,202 confirmed cases (727 in 2017 and 5,475 in 2018) [112]. It is also worthy of mentioning that there were 76 deaths reported: 2 in 2017 and 74 in 2018. For diphtheria, the outbreak began in July 2016 and remains ongoing. Since the beginning of the outbreak until EW 8 of 2019, a total of 2,726 suspected cases were reported (324 cases in 2016, 1,040 in 2017, 1,198 in 2018, and 164 in 2019); of these, 1,612 were confirmed (528 by laboratory and 1,084 by clinical criteria or epidemiological link), with 280 deaths reported (17 in 2016, 103 in 2017, 150 in 2018, and 10 in 2019), until March 2019 [110]. As expected, this is impacting other countries of the region.

In Brazil, the reintroduction of the measles virus in Manaus, and probably other areas, is likely related to the current outbreak in Venezuela from the recent decline in measles vaccine coverage [113]. In Colombia, during 2018, there were 204 cases of measles, 27% imported from Venezuela (22 cases from Caracas) and 58% related to imported cases (autochthonous transmission) [114]. In areas with appropriate measles vaccine coverage, such as was the case of Santa Rosa de Cabal, a municipality of Risaralda, the occurrence of an imported Venezuelan case did not evolve into an outbreak of autochthonous cases. However, in San Onofre, Sucre, from 3 imported cases from Venezuela, there were four additional autochthonous cases, as the vaccine coverage was not appropriate [115]. By the 51° epidemiological week of 2018, there were in total 54 imported cases and 106 cases related to the imported cases, including 16 imported cases in Cucuta and 10 cases related to them [115]. Also, pertussis is increasing among migrants, in 2017, there were 8 cases, 7 (88%) from Venezuela and in 2018, 46 with 43 (94%) from that country (Table 1) [57]. This would show a sentinel event of the real situation in Venezuela that has been underreported since between 2012 and 2016, only 17 cases of pertussis were notified to PAHO/WHO [8]. For the same period, also 290 cases of mumps were reported to PAHO/WHO [8]. Varicella, another VPD, is being increasingly reported among migrants, from 63 cases in 2017 (51% in Venezuelans) to 116 in 2018 (86% in Venezuelans) (Table 1) [57]. In 2015, as of September 12th (week 36), 41,294 accumulated cases of varicella were reported in the country. The incidence rate for 2015 was estimated in 171.36 cases per 100,000 inhabitants. The incidence rate for 2014 was 146.17 cases per 100,000 inhabitants [116]. In the case of mumps, this is also increasing among Venezuelan migrants, from 4 cases in 2017 to 12 in 2018 (Table 1) [57]. In Ecuador, the same genotype that originated in Venezuela was detected, for a total of 11 imported cases of the 19 cases reported in 2018 [117].

Other Tropical and Infectious Diseases

Other conditions reported to have increased among migrants from Venezuela in Colombia during 2018 and 2019 include snakebites [118], injuries by rabies-potentially transmitting animals, respiratory tract infections, hepatitis A (from 19 cases in 2017 to 171 in 2018), bacterial meningitis, congenital syphilis (from 19 cases in 2017 to 108 in 2018), gestational syphilis (from 38 cases in 2017 to 288 in 2018), conditions that were reported to be worsening in the last decades among pregnant women and children in Venezuela with multiple clinical consequences [119-123]. Other increases have been reported for HIV and other viral diseases [57, 58]. For HIV, more than 80% of imported cases in Colombia proceed from Venezuela affecting Norte de Santander (capital Cucuta) [9] particularly. In general terms, Norte de Santander is under warning, given the fact most communicable diseases are increasing from 2017 to 2018 and probably 2019 [57, 58].

In relation to HIV, the poor condition of the health system that Venezuela suffers, from not receiving medicine therefore also migrate in search of a treatment, this can take a long time, involuntary withdrawals, which can lead to the development of resistant strains and progression of disease, opportunistic infections, higher possibility of hospitalization and consumption of major hospital expenses [5, 9, 10, 53, 62, 119, 124-126].

According to studies conducted in the first decade of this century, the seroprevalence of Hepatitis C Virus (HCV) in the general population of Venezuela is approximately 1.5% [127], however, there is a lot of under-reporting of this viral infection [128], which probably it has been increased in recent years due to a major shortage of reagents for diagnosis [3]. Based on the above, the 6 million of crisis-related Venezuelan immigrants are taking to the host countries, at least 90,000 new cases of HCV infection, which obviously will have a major impact on the dynamics of HCV transmission in those countries.

Non-Communicable Diseases

The health status concerning non-communicable chronic diseases in Venezuela is no different from communicable infectious diseases. With only 15% of the essential medications available and only 10% of chemotherapy and biologicals needed to treat oncological patients [129], national oncology centers do not guarantee chemotherapy for some 140,000 people with a diagnosis of cancer. Of 25 radiotherapy units, only four are operational. According to the Venezuelan Health Alliance, surgical oncological interventions occur in less than half of patients needing these procedures. It is limited or a lack of availability of screening mammography or CT scanning imaging [130]. Facing scarcity of essential medication and broken-down medical equipment, women diagnosed with breast cancer in Venezuela resort to more radical means of treatment [131]. Treatments for breast cancer are no longer available in public hospitals. Even more, according to the National Institute of Health of Colombia (www.ins.gov.co), during 2017 there were at least 30 cases of breast and cervix cancer diagnosed among recently emigrated Venezuelans and 82 cases in 2018 (Table 2) [57]. By early 2019, there are five new cases reported among Venezuelan migrants (Table 2) [58].

The Venezuelan crisis has touched every area of the health system. Pathology national reference center (Instituto Anatomopatológico Dr. José O'Daly), in Caracas, received around 18,000-20,000 biopsies per year, in addition, to being the first training center for specialists, has started to decline its activities since 2014, afterward stopped definitely at the end of 2017. The insecurity to which staff and patients were subjected continuously besides the inability to acquire supplies, resulted in the halting of activity. The cancer diagnosis it has been reduced into the few private centers that have managed to maintain the activity but with retail prices are impossible to pay for the general populations, especially because many of them have been obliged to request payments in foreign currency. We must remember, the average monthly income of the Venezuelan worker is $6, biopsies prices can range from $25 (for example, skin punch) to $300 (simple mastectomy) [132].

Since 2016, more than 300,000 Venezuelans with chronic medical diseases including transplant patients, or those suffering hemophilia, cancer, Parkinson's disease, or multiple sclerosis have not received necessary medical treatments [130].

Table 2. Selected indicators of sexual and reproductive health and childhood health indicators among Venezuelan migrants reported by the National Institute of Health (www.ins.gov.co) of Colombia, 2017-2019.

Sexual and Reproductive Health and Childhood Health Indicators		Years 2017	2018	2019*
Breast cancer and cervix	N	30	82	5
	n Venezuela	26	80	5
	%	**86.7**	**97.6**	**100.0**
Extreme maternal morbidity	N	60	349	39
	n Venezuela	54	340	38
	%	**90.0**	**97.4**	**97.4**
Perinatal and late neonatal deaths	N	55	245	21
	n Venezuela	48	236	21
	%	**87.3**	**96.3**	**100.0**
Acute undernutrition in children <5 y-old	N	73	425	49
	n Venezuela	64	418	48
	%	**87.7**	**98.4**	**98.0**
Deaths due to undernutrition	N	3	11	0
	n Venezuela	3	11	0
	%	**100.0**	**100.0**	**0.0**
	CFR%	**4.7**	**2.6**	**0.0**
Low birth weight	N	65	257	29
	n Venezuela	63	254	29
	%	**96.9**	**98.8**	**100.0**
Birth defects	N	41	103	0
	n Venezuela	35	97	0
	%	**85.4**	**94.2**	**0.0**

*Till March 10, 2019. CFR%, case fatality rate (%).

The situation of patients with terminal organ failure who are candidates for transplantation and those who have already been transplanted is critical; among the reasons are the increase in the number of people on the waiting list for transplantation due to the paralysis of organ transplant activity with deceased donor and the drastic decrease in transplants with living donors due to the lack of availability in the country of induction immunosuppressive treatment, which is mandatory at the time of performing the transplant, the extremely precarious conditions because of shortages, equipment paralysis and continuous electricity and water supply failures in hospitals and public health centers that house transplant centers, the marked shortage of immunosuppressants and its consequences in terms of graft and patient survival, the shortage of reagents to measure levels of immunosuppressants such as tacrolimus and cyclosporine, hindering the appropriate control of post-transplant patients [133].

As a result, many transplant patients will inexcusably lose their grafts due to rejection, in addition, to become sensitized after exposure to non-self-human leukocyte antigen (HLA) experiencing permanent anguish, and in many cases, they will lose their lives.

Performing transplantation in highly sensitized receptors represents a challenge for any transplant program and the patients are forced to stay on transplant waiting lists for many years and ultimately may never find a donor, and they may never receive a transplant due to removal from or death while on the waiting list. Currently, it is estimated that up to 35% of patients who are on the waiting list for a transplant are sensitized, but in Venezuela, this number will increase progressively. This situation limits patients' access to transplant as well as the success of the transplant [134]. Desensitization protocols have shown acceptable short-term recipient and graft outcomes, but increased rates of acute and long-term antibody-mediated rejection and decreased overall allograft survival that has raised concerns about the long-term success, so sensitization is a significant barrier to successful transplantation [135]. On the other hand, desensitization protocols have been associated with an increased risk of BK virus (polyomavirus family) nephropathy [136] and they are costly, demand a long time, and most importantly, can produce many severe complications including hematoma, pneumothorax, catheter infection, anaphylactoid reaction, coagulopathy, hypotensive episodes, transmission of viral infection, and generalized infections of immunocompromised patients [17].

The Venezuelan Society of Nephrology (VSN-SVN) has documented the profound lack of resources to treat patients in dialysis units, the absolute absence of materials for peritoneal dialysis programs, which have been closed to admissions of new patient placing them in great risk.

The National Transplant Organization of Venezuela (ONTV) in partnership with the Venezuelan Nephrology Society, conducted an epidemiological study in April 2018, through the survey technique to gather information to more accurately characterize the scope and consequences of availability of immunosuppressant in the transplanted population or with renal pathology treated with this type of medication and the situation of those affected by renal pathologies that receive renal replacement therapy with dialysis and transplantation. Over 95% of the patients reported difficulty in obtaining immunosuppressants and the number of transplants fell by 80% between 2012 and 2017 [137].

In June 2017, the organ and tissue procurement system suspended procurement and allocation of organs, and so far, they have not resumed. Medical complications have been on the rise with a report of 42% in the year 2017.

The respondents reported a total of 366 medical complications, increased hospitalizations, the appearance of renal failure, rejection, graft loss, and 26 deaths and 54 dialysis admissions were reported due to renal graft loss.

The main reasons for the suspension of the transplant activity were the lack of immunosuppressant (96%), failures in the infrastructure (72%) and failures in the support services (60%) [137].

The number of individuals with end-stage kidney disease (ESRD) in 2015, in Venezuela, was 595 patients per million population under renal replacement therapies (RRTs) but no recent data is available [137].

Recent news indicated that apparently the Venezuelan Social Security Institute ignored the needs for equipment and dialysis therapies leading to approximately 5,000 patients with ESRD died between 2018 and 2019 [136].

There are reports of the impact on the quality of life and wellbeing of most of the Venezuelan population, which has worsened in the last five years. Occupational Safety and Health (OSH) is not a priority for firms in the middle of the economic emergency with a general deterioration of daily life [17].

Despite the relevance of this problem, research on the subject is very limited. Recent and pertinent data is needed to properly identify and measure the risks and negative consequences that workers and families are exposed to by the ongoing crisis [17].

Substantial governmental actions are needed in the immediate future to improve occupational safety and health of Venezuelan workers but, as expected with the current government, this is not a priority for health and labor authorities [24].

Also, a probably not properly assessed, suicide intention and gender violence, are part of mental consequences that are on the rise among migrants from Venezuela [57, 58]. Other problems, already reported in a significantly higher prevalence among internally displaced populations of Colombia, such as post-traumatic stress disorder and alcoholism, should also be studied on Venezuelan migrant and refugee populations [138, 139].

The Situation as Impediment to Achieve the Sustainable Development Goals

As individually analyzed, or compared with neighbor countries, Venezuela is in reverse for multiple SDG indicators (targets), as observed in recent data of WHO and its SDG statistics derived from the last World Health Statistics report for 2018 [140]. A comparison between Colombia and Brazil with Venezuela is presented in Table 3. Venezuela in 20 targets is worse than Brazil and Colombia: Life expectancy at birth, current health expenditure (CHE) as percentage of gross domestic product (GDP), maternal mortality ratio, under-five mortality rate, neonatal mortality rate, malaria incidence, Hepatitis B surface antigen (HBsAg) prevalence among children under 5 years, probability of dying from any of CVD, cancer, diabetes, CRD between age 30 and exact age 70, road traffic mortality rate, mortality rate attributed to exposure to unsafe WASH services, diphtheria-tetanus-pertussis (DTP3) immunization coverage among 1-year-olds, measles-containing-vaccine second-dose (MCV2) immunization coverage by the nationally recommended age, pneumococcal conjugate third dose (PCV3) immunization coverage among 1-year old's, domestic general government health expenditure (GGHE-D) as percentage of general government expenditure (GGE), prevalence of stunting in children under five, prevalence of wasting in children under five, proportion of population using safely managed sanitation services, mortality rate due to homicide and completeness of cause-of-death data (Table 3).

Maternal and Child Health in Venezuelan Migrants to Colombia

Pregnant women are migrating due to the country's conditions. According to the National Institute of Health of Colombia, in 2017, there were 649 newborns in which the mother was migrating from Venezuela, increasing to 3,048 in 2018 (873% increase). Most were born in Norte de Santander, but also in La Guajira, Bogota, Bolivar and Arauca [57]. In 2017, a total of 2,320 people from Venezuela crossed the border requiring medical attention in Colombia, 23.9% were less ten years old. In 2018, that figure increased to 6,172, with 28.9% below ten years of age [57]. In 2019, 558 new people were reported on those conditions, 27.1% children less than ten years of age [58]. From the total of people diagnosed by the healthcare system of Colombia in 2018 proceeding from

Venezuela, 19.8% were housewives. In 2017, 60 pregnant women with extreme maternal morbidity from other countries arrived in Colombia, 90% of Venezuela, but in 2018 were 349 with 97.4% from that country (Table 2) [57]. In 2019, so far, 39 women have been diagnosed, 38 (97.4%) from Venezuela (Table 2) [58].

Unfortunately, WHO data is consistent with the figures of migrant cases in Colombia from Venezuela for maternal mortality. In 2017, seven deaths were reported from migrant pregnant women (all from Venezuela). In 2018, this increased to 15 (all from Venezuela). For 2019, three additional deaths have been reported [57, 58]. For perinatal and late neonatal mortality, figures are high, with 55 deaths in 2017 from migrants, 87.3% from Venezuela, increasing to 245 in 2018, with 96.3% from Venezuela (Table 2) [57].

In 2019, there are 21 additional deaths, all from Venezuelan migrants (Table 2) [58]. From 2012 to 2016, infant deaths in Venezuela increased by 63% and maternal mortality more than double [5].

Children health, as seen in these data, is precarious in Venezuela [15, 16]. There is no longer an appropriate coverage of vaccines. Moreover, vaccine-preventable diseases are raising with no control and spilling over to other countries in the region [5, 8, 11, 22, 28, 53, 111, 141]. Besides all the above, the anti-vaccination movement in the last time has increased the risk of diseases already controlled in our region, mainly measles. However, others such as tetanus and polio could be relevant if the mentioned factors are not controlled [142]. In this context, Amerindians of Venezuela have been significantly affected by this situation, suffering from multiple VPDs, especially measles and diphtheria [8, 111]. Among Amerindians, recently also trachoma, a neglected tropical disease, has also been reported in the southern border area with Brazil [12]. A cluster of five migrant Amerindian children from Venezuela to Brazil (Belen, Para state) were recently reported dead due to suspected pneumonia, probably influenza [143].

Malnutrition Cases

Children in Venezuela, but also the adult population are suffering from food insecurity and malnutrition. As Venezuela's economic and political crises continue to evolve, hyperinflation, declining food production and food shortages are contributing to the deterioration of the food and nutrition situation [23]. The prevalence of undernutrition has been increasing from 3.6% (2010-2012) to 11.7% (2015-2017) [23]. In 2018, there were at least 540 pediatric hospital admissions with acute malnutrition across the states of Venezuela, 77% of them, in Delta Amacuro. Of them, 202 died, 69% in Delta Amacuro [23]. This is also being reflected in migrants from Venezuela in Colombia, in 2017 there were 73 cases of children <5 years-old arriving from other countries diagnosed with acute undernutrition, 88% from Venezuela. In 2018, this was 5.8 times higher (425), with 98% from Venezuela. In 2019, there have been 49 with 48 (98%) from Venezuela (Table 2) [57, 58]. In 2017-2018 there were 14 deaths due to undernutrition in Venezuelan children arriving and being diagnosed in Colombia (CFR% 2.3) (Table 2) [57]. Even more, low birthweight has also been reported increasingly among migrant newborns arriving from Venezuela. In 2017 there were 65 newborns with low birthweight, 97% from Venezuela, in 2018, 257 with 99% from Venezuela and in 2019, 29, all from Venezuela (Table 2) [57, 58].

Also, birth defects, are increasing among Venezuelan migrants. In 2017, there were 41 birth defects among migrant newborn, 85% were from Venezuela; in 2018, the figure increased to 103, with 94% from Venezuela (Table 2) [57, 58]. Food security in Venezuela is also a threat by problems of water supply and sanitation that threats the previous advances in the control of soil-transmitted helminthiasis and other food-borne pathogens [144-147].

Humanitarian crisis

Very recent conservative estimates indicate that Venezuela is in the throes of a humanitarian crisis. Infant mortality rate reached 21.1 deaths per 1,000 live births (90% CI −17.8 to 24.3) in 2016, almost 1.4 times the rate of 2008 (15.0, −14.0 to 16.1) [15]. The increase in infant mortality rate in 2016 compared with 2008 takes the country back to the level observed at the end of the 1990s, wiping out 18 years of expected progress, and leaves the Venezuelan Government far from achieving the target of nine deaths per 1000 livebirths stated in the UN Millennium Development Goals [15].

Venezuela has endured an unprecedented and worsening humanitarian crisis and anthropogenic disaster that has forced more than 4 million people to flee the country over the past two years alone. Countries like Colombia, Peru, and Ecuador have declared a State of Emergency given the Influx of Venezuelan Refugees seeking to enter their territories [148].

All of the above health indicators illustrate that the resulting public health and health services crisis in Venezuela is appalling and requires urgent attention. Health outcomes are approaching catastrophic levels [4, 29, 53].

Table 3. Health-related SDG statistics in Brazil, Colombia, and Venezuela, based on WHO health statistics [140].

SDG	Indicator	Source	Sex	Year	Brazil	Colombia	Venezuela (Bolivarian Republic of)
	Total population [a] (000s)	Comparable estimates		2016	207 653	48 653	31 568
	Life expectancy at birth [b,c] (years)	Comparable estimates	Male Female Both sexes	2016	71.4 78.9 75.1	71.5 78.8 75.1	**69.5** 79.0 **74.1**
	Healthy life expectancy at birth [b,c] (years)	Comparable estimates		2016	66.0	67.1	66.1
	Current health expenditure (CHE) per capita [d] (US$)	Comparable estimates		2015	780	374	973
	Current health expenditure (CHE) as percentage of gross domestic product (GDP) [d] (%)	Comparable estimates		2015	8.9	6.2	**3.2**
3.1	Maternal mortality ratio [e] (per 100 000 live births)	Comparable estimates		2015	44	64	**95**
	Proportion of births attended by skilled health personnel [f] (%)	Primary data		2007–2017	99 [ag]	96	96 [ag]
3.2	Under-five mortality rate [g] (per 1000 live births)	Comparable estimates		2016	15.1	15.3	**16.3**
	Neonatal mortality rate [g] (per 1000 live births)	Comparable estimates		2016	7.8	8.5	**10.3**
3.3	New HIV infections [h] (per 1000 uninfected population)	Comparable estimates		2016	0.24	0.12	0.21
	Tuberculosis incidence [i] (per 100 000 population)	Comparable estimates		2016	42	32	32
	Malaria incidence [j] (per 1000 population at risk)	Comparable estimates		2016	6.7	17.2	**44.7**
	Hepatitis B surface antigen (HBsAg) prevalence among children under five years (%) [k] (%)	Comparable estimates		2015	0.07	0.21	**0.62**
	Reported number of people requiring interventions against NTDs [l]	Other data		2016	10 461 013	3 761 361	282 294
3.4	Probability of dying from any of CVD, cancer, diabetes, CRD between age 30 and exact age 70 [c,m] (%)	Comparable estimates		2016	16.6	15.8	**18.1**
	Suicide mortality rate [c,m] (per 100 000 population)	Comparable estimates		2016	6.5	7.2	3.7
	Total alcohol per capita (>= 15 years of age) consumption [n] (litres of pure alcohol)	Comparable estimates		2016	7.8	5.8	5.6
3.6	Road traffic mortality rate [o] (per 100 000 population)	Comparable estimates		2013	23.4	16.8	**45.1**
3.7	Proportion of married or in-union women of reproductive age who have their need for family planning satisfied with modern methods [p] (%)	Primary data		2007–2017	89.3	86.5	-
	Adolescent birth rate [q] (per 1000 women aged 15-19 years)	Primary data		2007–2016	60.8	71.6	-
3.8	UHC service coverage index [r]	Comparable estimates		2015	77	76	73
	Population with household expenditures on health > 10% of total household expenditure or income [s] (%)	Primary data		2007-2015	25.6	16.9	-
	Population with household expenditures on health > 25% of total household expenditure or income [s] (%)	Primary data		2007-2015	3.5	2.8	-
3.9	Age-standardized mortality rate attributed to household and ambient air pollution [c,t] (per 100 000 population)	Comparable estimates		2016	29.9	37.0	34.6

SDG	Indicator	Source	Sex	Year	Brazil	Colombia	Venezuela (Bolivarian Republic of)
	Mortality rate attributed to exposure to unsafe WASH services [c,t] (per 100 000 population)	Comparable estimates		2016	1.0	0.8	**1.4**
	Mortality rate from unintentional poisoning [c,m] (per 100 000 population)	Comparable estimates		2016	0.2	0.4	0.3
3.a	Age-standardized prevalence of tobacco smoking among persons 15 years and older [u] (%)	Comparable estimates	Males Females	2016	17.9 10.1	13.5 4.7	- -
3.b.1	Diphtheria-tetanus-pertussis (DTP3) immunization coverage among 1-year-olds [v] (%)	Comparable estimates		2016	86	91	**84**
	Measles-containing-vaccine second-dose (MCV2) immunization coverage by the nationally recommended age [v] (%)	Comparable estimates		2016	72	87	**53**
	Pneumococcal conjugate third dose (PCV3) immunization coverage among 1-year olds [v] (%)	Comparable estimates		2016	94	89	**7**
3.b.2	Total net official development assistance to medical research and basic health per capita [w] (US$), by recipient country	Primary data		2016	0.03	0.07	0.00
3.c	Density of physicians [x] (per 1000 population)	Primary data		2007–2016	1.9	1.8	-
	Density of nursing and midwifery personnel [x] (per 1000 population)	Primary data		2007–2016	7.4	1.1	-
	Density of dentistry personnel [x] (per 1000 population)	Primary data		2007–2016	1.2	1.0	-
	Density of pharmaceutical personnel [x] (per 1000 population)	Primary data		2007–2016	0.7	-	-
3.d	Average of 13 International Health Regulations core capacity scores [y]	Other data		2010–2017	96	88	94
1.a	Domestic general government health expenditure (GGHE-D) as percentage of general government expenditure (GGE) [d,z] (%)	Comparable estimates		2015	7.7	12.2	**3.1**
2.2	Prevalence of stunting in children under five [aa] (%)	Primary data		2007-2016	7.1	12.7	**13.4** [an]
	Prevalence of wasting in children under five [aa] (%)	Primary data		2007-2016	1.6	0.9	**4.1** [an]
	Prevalence of overweight in children under five [aa] (%)	Primary data		2007-2016	7.3	4.8	6.4 [an]
6.1	Proportion of population using safely managed drinking-water services [ab] (%)	Comparable estimates		2015	-	71	-
6.2	Proportion of population using safely managed sanitation services [ab] (%)	Comparable estimates		2015	39	20	**19**
7.1	Proportion of population with primary reliance on clean fuels [t] (%)	Comparable estimates		2016	>95	92	>95
11.6	Annual mean concentrations of fine particulate matter ($PM_{2.5}$) in urban areas [t] (µg/m3)	Comparable estimates		2016	11.8	17.2	16.8
13.1	Average death rate due to natural disasters [c,m,ac] (per 100 000 population)	Comparable estimates		2012-2016	<0.1	0.3	<0.1
16.1	Mortality rate due to homicide [c,m] (per 100 000 population)	Comparable estimates		2016	31.3	43.1	**49.2**
	Estimated direct deaths from major conflicts [c,m,ac,ad] (per 100 000 population)	Comparable estimates		2012-2016	0.3	0.5	0.3
17.19.2	Completeness of cause-of-death data [c,m,ae] (%)	Comparable estimates		2007-2016	97	79	**89**

Footnotes:

a World Population Prospects: the 2017 revision. New York (NY): United Nations, Department of Economic and Social Affairs, Population Division; 2017.

b "Global Health Estimates 2016: Life expectancy, 2000–2016. Geneva, World Health Organization; 2018 (http://www.who.int/gho/mortality_burden_disease/life_tables/en/)."

c WHO Member States with a population of less than 90 000 in 2016 were not included in the analysis.

d "Global Health Expenditure Database [online database]. Geneva: World Health Organization (http://apps.who.int/nha/database/Select/Indicators/en/, accessed 7 April 2018). Global and regional aggregates are unweighted averages."

e "WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Trends in maternal mortality: 1990 to 2015. Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2015 (http://www.who.int/reproductivehealth/publications/monitoring/maternal-mortality-2015/en/, accessed 29 March 2018). WHO Member States with a population of less than 100 000 in 2015 were not included in the analysis."

f "Joint UNICEF/WHO database 2018 of skilled health personnel, based on population-based national household survey data and routine health systems data. New York (NY): United Nations Children's Fund; 2018 (https://data.unicef.org/wp-content/uploads/2018/02/Interagency-SAB-Database_UNICEF_WHO_Apr-2018.xlsx)."

g "Levels & Trends in Child Mortality. Report 2017. Estimates developed by the UN Inter-agency Group for Child Mortality Estimation. United Nations Children's Fund, World Health Organization, World Bank and United Nations. New York (NY): United Nations Children's Fund; 2017 (http://www.childmortality.org/files_v21/download/IGME%20report%202017%20child%20mortality%20final.pdf, accessed 29 March 2018)."

h "AIDSinfo [online database]. Geneva: Joint United Nations Programme on HIV/AIDS (UNAIDS) (http://aidsinfo.unaids.org/, accessed 30 March 2018), and HIV/AIDS [online database]. Global Health Observatory (GHO) data. Geneva: World Health Organization (http://www.who.int/gho/hiv/epidemic_status/incidence/en/, accessed 30 March 2018)."

i Global tuberculosis report 2017. Geneva: World Health Organization; 2017 (http://www.who.int/tb/publications/global_report/en/, accessed 30 March 2018).

j "World malaria report 2017. Geneva: World Health Organization; 2017 (http://www.who.int/malaria/publications/world-malaria-report-2017/report/en/, accessed 30 March 2018)."

k "Global and Country Estimates of immunization coverage and chronic HBV infection [online database]. Geneva: World Health Organization; 23 March 2017 update (http://whohbsagdashboard.com/#global-strategies, accessed 30 March 2018). This indicator is used here as a proxy for the SDG indicator."

l "Neglected tropical diseases [online database]. Global Health Observatory (GHO) data. Geneva: World Health Organization (http://www.who.int/gho/neglected_diseases/en/, accessed 30 March 2018)."

m "Global Health Estimates 2016: Deaths by cause, age, sex, by country and by region, 2000–2016. Geneva: World Health Organization; 2018. (http://www.who.int/healthinfo/global_burden_disease/estimates/en/index1.html)."

n "WHO Global Information System on Alcohol and Health (GISAH) [online database]. Global Health Observatory (GHO) data. Geneva: World Health Organization (http://www.who.int/gho/alcohol/en/, accessed 30 March 2018)."

o "Global status report on road safety 2015. Geneva: World Health Organization; 2015 (http://www.who.int/violence_injury_prevention/road_safety_status/2015/en/, accessed 30 March 2018). WHO Member States with a population of less than 90 000 in 2015 who did not participate in the survey used to produce the report were not included in the analysis."

p "Data by country, pertaining to women aged 15-49 years who were married or in union, extracted by WHO from World Contraceptive Use 2018 [online database]. New York (NY): United Nations, Department of Economic and Social Affairs, Population Division; 2018 (http://www.un.org/en/development/desa/population/publications/dataset/contraception/wcu2018.shtml, accessed 2 May 2018). Global and regional aggregates are estimates for the year 2018 from: Model-based Estimates and Projections of Family Planning Indicators 2018. New York (NY): United Nations, Department of Economic and Social Affairs, Population Division; 2018 (http://www.un.org/en/development/desa/population/theme/family-planning/cp_model.shtml, accessed 2 May 2018)."

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y "International Health Regulations (2005) Monitoring Framework [online database]. Global Health Observatory (GHO) data. Geneva: WHO (http://www.who.int/gho/ihr/en/). Global and regional aggregates are for the year 2017."

z This indicator is presented here as it could constitute the health-related portion of the SDG indicator 1.a.2.

aa "Levels and trends in child malnutrition. UNICEF/WHO/World Bank Group Joint Child Malnutrition Estimates. New York (NY), Geneva and Washington (DC): United Nations Children's Fund, World Health Organization and the World Bank Group; 2018. Global and regional aggregates are for the year 2017."

ab "Progress on drinking water, sanitation and hygiene – 2017 update and SDG baselines. Geneva and New York (NY): World Health Organization and United Nations Children's Fund; 2017 (https://washdata.org/sites/default/files/documents/reports/2018-01/JMP-2017-report-final.pdf, accessed 31 March 2018) and Water and sanitation [online database]. Global Health Observatory (GHO) data. Geneva: World Health Organization (http://www.who.int/gho/mdg/environmental_sustainability/en/). Comparable estimates are only shown for countries with recent primary data."

ac The death rate is an average over the five-year period.

ad Conflict deaths include deaths due to collective violence and exclude deaths due to legal intervention.

ae "Completeness was assessed relative to the de facto resident populations and refer to the latest available value for the period 2007–2016. Global and regional aggregates are for 2016."

af "Non-standard definition. For more details see the Joint UNICEF/WHO database 2018 of skilled health personnel (https://data.unicef.org/wp-content/uploads/2018/02/Interagency-SAB-Database_UNICEF_WHO_Apr-2018.xlsx)."

ag Proportion of institutional births (%) used as a proxy for the SDG indicator.

ah Updated estimate.

ai Preliminary data.

aj "Deviation from standard question or measurement method. For more details see World Contraceptive Use 2018 (http://www.un.org/en/development/desa/population/publications/dataset/contraception/wcu2018.shtml)."

ak Under country consultation as of May 2018.

al Data refer to year 2016. Data for 2017 were submitted in a format that could not be included in the analysis.

am Survey data did not cover the 0–59 months age range. Data were adjusted for comparability.

an Conversion of estimates based on the old NCHS/WHO references to WHO Child Growth Standards when raw data were not available to allow comparability.

ao Data are from a facility-based surveillance system, which include 80% of health centres in the country.

ap Prevalence of overweight was calculated using BMI-for-age z-scores.

aq For high-income countries with no information on clean fuel use, usage is assumed to be >95%.

ar Completeness refers to year prior to 2012.

as Data are from the Nutrition Survey System, which covers 25 provinces.

The worse scenario for health maybe, after electric shutdown and lack of appropriate water supplies, would be still to be seen.

Due to the breakdown of health infrastructure and precarious public health activities, the menace of polio resurgence in Venezuela has been entertained [11].

Certainly, emerging and reemerging infectious diseases, still under control, such as yellow fever [149-151], onchocerciasis [14], Venezuelan equine encephalitis (VEE) together with emerging circulating viruses such as Mayaro [152-156], Madariaga or Oropouche viruses [157], may potentially reach epidemic proportions in Venezuela and could spill over into neighboring countries. The most common and effective VEE vaccine, TC-83, can no longer be bought or produced in Venezuela. Zoonotic diseases such as VEE and even foot-and-mouth disease (FMD) are at risk of epizootics and epidemics due to failures in vaccination coverage and performance. According to the Pan-American Center for FMD (PANAFTOSA), phylogenetic analyses revealed that the recent introduction of FMD in Colombia was originated in Venezuela [158]. As a consequence of this, Venezuela was classified as a country without an OIE (Office International des Epizooties) official status for FMD, and Colombia was suspended of FMD free status [159].

The production of this vaccine by the Agricultural Research Institute has halted due to restricted production capacity coupled with a lack of financial support. The risk of latent outbreaks of VEE and its potential international spread increases with the presence of wild donkeys, lack of sanitary control and persistent circulation of epizootic VEE strains in different sites of the plains and the Catatumbo region of Venezuela-Colombia [14], which is an area considered transborder crossing from one country to another. FMD have been reported in cattle and swine in municipalities of La Guajira and Cesar in 2018, posing a significant agricultural risk to animal production and potentially impacting food security [160]. Many of these conditions, in the context of lack of research and a defunct healthcare system in crisis and no conditions for appropriate surveillance, research and control represent a major threat to animal health and zoonotic diseases [161, 162].

Trained People Leaving the Country: the Venezuelan Diaspora

The consequences over time regarding the situation in Venezuela also impacts health due to the ongoing significant brain drain, that includes trained physicians and scientists [161, 163]. The year 2018, when Chile gave its national exam to certify doctors to work in its public health system, just over 5,000 applicants sat down to take the test. Almost half of them, 2,300, were physicians from Venezuela [164]. From the beginning of the Chávez government in 1998, highly-qualified medical personnel have been forced to abandon the country, which has contributed significantly to this destabilization. As reported by a survey conducted by the Venezuelan Physicians Association in Spain (AMEVESP, by its Spanish acronym), it is estimated that there exist approximately Venezuelan 5,000 physicians, a large number of them incorporated in the Spanish health system. The actual number of doctors living in other European countries remains unknown, but the exodus is continuing now. In 2017 the Venezuelan citizens were the largest group applying for their overseas medical degree recognition. Not to mention those physicians yearning to get out soon. The Venezuelan medical community was the first group severely punished by the so-called "21-century Socialism". In Spain, the Association of Venezuelan Physicians in Spain has 1,200 members [165].

Given this situation, that would lead to a lack of specialists, including infectious diseases physicians, probably antimicrobial resistance [166-168] is also significantly upraising in Venezuela with the implications of internationally spreading to other countries [169-172].

Venezuelans are no longer happy. Venezuela's ranking on the world happiness index has plummeted in the last five years. The World Happiness Report 2018 ranked the happiness for 2015-2017 of Venezuela in the place 102° of 156 countries, but worse, it is the country in the whole world with the most marked change in happiness from 2008-2010 to 2015-2017 (place 140° of 140 countries with changes) [173]. Many factors play a part in people's wellness, and all the indicators shown depict how Venezuelan's quality of life is steadily deteriorating.

Poor governance has destroyed all institutional accountability mechanisms to power the country [174]. The resulting humanitarian crisis has profound implications in social justice including growing health inequities and inequalities among impoverished and underserved populations nationwide.

There is an urgent need for national and international institutions, governments and other stakeholders to address the growing unmet basic needs of Venezuelans [5, 8, 14, 174]. The moral economy of life in Venezuela reveals troubling tensions in the way government institutions treat their citizens.

There is no time to wait. In Venezuela, unnecessary suffering and a growing number of preventable deaths occur every day among children, mothers, adults, and grandparents.

Because of a visit by a Commission of the Office of the United Nations High Commissioner for Human Rights (OHCHR) to Venezuela, a statement by UN High Commissioner for Human Rights Michelle Bachelet, at the 40th session of the Human Rights Council, declared that "the health system continues to deteriorate, with a very significant impact on maternal mortality and morbidity and infant mortality" [175].

The main limitation of a review such as this is the difficulty in quantifying the magnitude of health problems and their long-term consequences. Some of the indicators available in Venezuela seem similar or even better than those in other countries (for example, the incidence of TB and the suicide rate, see Table 3). However, this may be due to underreporting or selection biases (such as survivor bias). Therefore, the lack of reliable data is in itself a part of the problem that must be addressed as a priority.

Conclusions

Finally, also consequences, especially seen in Colombia and Brazil, would be expected to occur in other countries such as Ecuador, Peru, Chile, Argentina, Paraguay, Uruguay, Trinidad, and Tobago, United States, and even beyond the Americas, in Spain, given the efflux of Venezuelan migrants, as has been described [4, 53]. For example, just between 2016 and 2017, Uruguay noted a significant increase in the number of migrants from Venezuela, 7,039 people migrated and asked for residency, with 5,448 more in 2018, with estimations of around 8,500-12,000. Some calculations indicate that almost 40% enrolled in public schools in Montevideo, Uruguay is Venezuelan. Even, the International Organization for Migration (IOM), performed a survey among 399 Venezuelan migrants finding that over 54% of them were age 26-38 years-old, 50.6% with university education, 30.4% from Caracas, 58.6% entering by air, 34.1% by land and 7.3% by sea; 74.1% arrived less than 1 year ago.

Assessing the routes of arrival migrants moved through a direct flight from Caracas to Montevideo, or by a stop in Brazil, Colombia or Argentina, among other countries [176]. According to physicians in Uruguay, the local population does not perceive the Venezuelan migrants as a source of risk for infectious diseases, especially for vector-borne diseases, given the ecological conditions of the country, e.g., without vectors.

We are barely aware of the impact of the different pathologies and infectious diseases to which Venezuelan citizens have been exposed due to the absolute loss of control over health, and the political chaos we have been in for the last 20 years. Every country that opens us its doors is assuming a great responsibility since it is not only accepting the person but also all their benefits and needs (Figure 3). Some of the health systems of those countries are neither accustomed nor prepared to receive such patients. That translates into congestion in health care services and additional expenses [177]. We are jointly responsible not only as health personnel but also as a society for calamities such as those described in this document. Massive migrations through wars, famines and authoritarian governments affect all inhabitants of the planet.

In conclusion, there is an increase in the demand for health services by migrants from Venezuela in the receiving countries. This tendency is observed concerning multiple health problems and the mechanisms involved are difficult to quantify but they seem to be the result of different aspects of the humanitarian crisis. This issue represents a public health alert that requires prioritization by the international community for a multisectoral approach.

Figure 3. Venezuelan migrants in Colombia asking for money at streets (Pereira, April 2, 2019).

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***Corresponding Author**: Alfonso J. Rodriguez-Morales, Public Health and Infection Research Group, Faculty of Health Sciences, Universidad Tecnológica de Pereira, Pereira, Risaralda, Colombia. Editor-in-Chief, Revista Panamericana de Enfermedades Infecciosas, Asociación Panamericana de Infectología. Email address: arodriguezm@utp.edu.co. Phone: +57(300)884-74-48.