



Opinion

The Colombian peace deal and its impact on the evolution of tropical diseases agents



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ABSTRACT

The armed conflict in Colombia (FARC rebels vs. Colombian government) is one of the oldest in Western countries, including thousands of deaths, massacres and terrible living conditions for those who have perceived it closely. It was until 2016 that this conflict reached a historic and longed for ceasefire agreement. This new social condition brought many benefits for the country, since agriculture has been renewed and trade and tourism have been activated in many regions that were affected by this senseless war. However, it should be noted that this reintegration and migration of individuals outside the law, and even of the same military of the National Army that were in combat, involved in wild cycles of insects and pathogens transmitting diseases to rural areas where mosquitoes also circulate; can have an impact on National Health Systems and plans for the control and prevention of vector-borne diseases, as they could cause outbreaks where infection rates are increased mainly in the normalization zones (“zonas veredales”) where FARC numbers will be concentrated. This may have an effect on the diversity of causal agents of these diseases. Then, it would be of great importance to have an adequate management plan and to keep in mind the costs that must be assumed by the government for the diagnosis, treatment and surveillance of people who may be affected.

1. Background

Civil wars in the world have existed for many years, causing thousands of deaths associated with the injustice, inequality and causing important social, economic and environmental impacts. Additionally, the wars have had an important relationship with the emergence of epidemics, since the instability in the structure of the affected societies implies affectations in the health systems, damaging the systems of surveillance, control and prevention of diseases (Ozaras et al., 2016). Going back to history, there are several cases of epidemics attributed to wars that have caused higher mortality rates than the war itself (Bollet, 2004; Smallman-Raynor and Cliff, 2004). For example, the Franco-Prussian War caused large number of deaths and cases reported in the combatant and non-combatant population due to infectious diseases (Short and Am, 2008). The typhoid fever that affected more than 7.7% of American soldiers around 1898 (Cirillo, 2000). Another case in Afghanistan, involving the displacement of populations seeking refuge to areas with malaria transmission, increasing the number of cases by *Plasmodium vivax* (Karim et al., 2016). Also, the situation with the armed conflict in Syria, where there have been reports of tuberculosis,

cutaneous leishmaniasis, polio and measles, among others, since the migration of people to the shelters generates overcrowded conditions under inadequate sanitary conditions. These evidences show an alarming need to improve health systems, not only nationally but also internationally, since nearby countries that receive refugees have presented an increase in several of these diseases, showing the need to improve surveillance, prevention, diagnosis plans, control and treatment of diseases (Sahloul et al., 2016; Ozaras et al., 2016).

It is clear that the relationship between endemic diseases and war is due to the fact that reported cases of morbidity and mortality during times of violence are attributed to the migration of military personnel to war zones, to the presence of hostages in endemic areas and jungle, the displacement of non-combatants in search of refuge, and the displacement of combatants in different regions that are under conflict (endemic areas for different diseases) (Smallman-Raynor and Cliff, 2004). However, it should be noted that there is a need to improve the monitoring of the different diseases caused during and after the war, in order to establish the implications or impact of a certain conflict in the emergence and re-emergence of infectious diseases.

Colombia has not been the exception. Armed conflict between the

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Abbreviations: FARC, Fuerzas Armadas Revolucionarias de Colombia; DTU, Discrete Typing Unit; TcI, *Trypanosoma cruzi* I; TcII, *Trypanosoma cruzi* II; TcIII, *Trypanosoma cruzi* III; TcIV, *Trypanosoma cruzi* IV; TcV, *Trypanosoma cruzi* V; TcVI, *Trypanosoma cruzi* VI; US, United States

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FARC rebels and the Colombian government has been one of the main causes of death by murders, massacres and all sorts of acts associated with suffering and terror (BBC, 2016). However, in the year 2016 a peace agreement was reached that has revived the economy, tourism, agriculture and even improve the hope of living in conditions suitable for many of the inhabitants of the regions most affected by the war.

Within all the implications that this process of negotiations has brought for the country, there is an aspect that must be considered and is the management of some diseases and the biological and non-communitarian consequences that could be presented with the plans established by the government for the demobilization of the guerrillas after the peace agreement. Among these diseases, the transmission of vectors is primarily found, since the invasion of jungle ecosystems by these individuals outside the law has generated interference in the life cycles of some parasitic agents such as *Leishmania*, *Trypanosoma cruzi*, *Plasmodium* spp. (Hernández and Ramírez, 2013) and some viruses as Dengue, Zika and Chikungunya.

Although in Colombia, the diseases caused by the above mentioned infectious agents are part of the surveillance, control and prevention system (SIVIGILA, 2017). It is necessary to have a contingency plan or to forecast how in the near future it could impact the demobilization process (Negret et al., 2017) to communities close to the upland areas and recruitment and demobilization camps, since the transmission of these infections by circulating mosquitoes could increase and have important effects on the biology of the pathogen and on the dynamics of its transmission, since species or strains could be brought from the jungle area to rural areas (Ferro et al., 2015; Valderrama-Ardila et al., 2010). This causing new outbreaks and perhaps the possibility of recombination or genetic exchange mechanisms that favor the diversification of the pathogen and are associated with unknown clinical manifestations as happened with the Zika virus (Faye et al., 2014; Schuler-Faccini, 2016). This would imply not only the effect on the individual affected but also the individual and governmental costs involved in the diagnosis, treatment and sustained prevention in these regions where the report of infections associated with these pathogens may increase (White et al., 2016; Karimkhani et al., 2016; Meheus et al., 2013; Castillo-Riquelme et al., 2008).

Therefore, the main objective of this manuscript is to show the implications that the demobilization process of the FARC rebels could have on the dissemination of vector-borne diseases that might affect the evolution of the pathogenic agents.

2. History landmarks of the armed conflict in Colombia

The armed conflict in Colombia has been one of the oldest in the Western world, with more than 260,000 deaths, thousands of people missing, displaced, rapes, kidnappings and countless personal tragedies. Although its beginning is not very clear, there are some theories that go back to the decade of 1920, where the first combats were given as a result of the fight for the land provoking a social and armed problem. Some propose the beginnings of the war towards the year 1950 defined as a period of violence, where the armed conflict begins with the clashes between the liberal and conservative parties, leaving more than 200,000 deaths. Others, date the beginning of the conflict at the end of the National Front towards the decade of the 80's with the rise of drug trafficking and contraband that allowed the subversive and drug trafficking groups to maintain and expand in the Colombian territory and even abroad, (Vargas, 1999) financing illegal acts, increasing acts of violence and harm to society. All in a supposed revelation against the State that initially sought changes that would benefit the Colombian population.

As the beginning dates, the reasons explaining commence of the conflict are not quite clear. It is possible that one reason has been the dispute over the land and its exploitation. Equally, the capitalism that causes the class struggle, the inequality and weakness of the State to confront criminal acts such as kidnapping and drug trafficking. The lack

of organization and protection in the affected regions, emerged alternative armies of insurgents in Colombia (Las teorías del conflicto armado en Colombia, 2015), with great capacity of recruitment such as the Revolutionary Armed Forces of Colombia (FARC) and The Army of National Liberation (ELN), among others. These subversive groups were gradually established in different regions of the country, mainly to *peri* urban areas of small municipalities, rural and jungle areas, where in addition to establishing illicit crops mainly of cocaine for its traffic and use (making Colombia one of the main producers of cocaine in the world) and illegal mining, they interposed among the forest ecosystems affecting them dramatically (Negret et al., 2017).

3. The peace deal negotiations with the FARC

During the course of the whole armed conflict, there were several attempts to establish peace between the government and the FARC. The first was in 1984 where there were several murders of members of the guerrillas by the extreme right, ending any possibility of negotiation. Years later, other attempts were generated between 1991 and 92 and 1998–2002, but they were not successful either. Towards the year 2000, the United States intervenes in the framework of the “Plan Colombia” supplying funds in the fight against the guerrillas. Subsequently, the guerrillas reach a large military capacity with more than 20,000 men in arms that trigger massacres, kidnappings and extortion. This is mainly due to the growth of economic gains at the expense of illegal coca trade to the United States. Since 2002, a weakening in combat caused by the death of several guerrilla leaders, leading them and the government to a reasonable position to start negotiations and reach an agreement to stop the war. In November 2012, dialogues began between FARC leaders and the government, opening up an opportunity to approach peace. On August 28th, 2016, the cease-fire and hostilities began on a bilateral and indefinite basis. The Colombian Armed Forces initiated operations that guarantee the safety of the guerrillas who demobilize and move to zones for the disarmament and reintegration process (Zones for Normalization, in Spanish “Zonas Veredales”), as agreed in Havana, that allowed the violence rates to decrease markedly during the year 2016 (BBC, 2016; Presidencia de la República, 2016).

4. The FARC demobilization and the tropical diseases

Considering the previous facts, and in particular the living conditions of both military combatants, guerrillas, criminal groups and drug traffickers involved in the armed conflict. It is possible to state that these groups are exposed not only to their own deaths and consequences of the war itself, but of the possible ambushes of insects that transmit tropical diseases such as Chagas disease, Leishmaniasis, Malaria and Arboviruses. Therefore, once the guerrillas who live in settlements in the jungle are willing to migrate to the zones for normalization (“Zonas Veredales”) (sites close to each front of the FARC for the guerrillas to concentrate for months before their definitive demobilization and where they will be accompanied by Military forces and members of the United Nations), to surrender weapons and begin their reintegration into society, initiates a series of social, political, behavioral and environmental changes that have different effects on the community and its environment. One of them and of great impact is the one concerning the public health, since due to the permanent contact of both guerrillas and military personnel who fight in jungle and peri-urban zones with different microorganisms that cause endemic diseases in Colombia, it is highly probable the emergence of novel outbreaks in rural areas, camps or hamlets intended for demobilized people. The emergence of new cases that had not been previously reported and the diversification of pathogens, the latter resulting in new mechanisms of adaptation and resistance that would put in difficulties the plans of control, treatment and prevention stipulated by the respective health entities in charge of the surveillance and control of tropical diseases in

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