

EBOLA 2013/2016 OUTBREAK AND THE SPATIAL MULTIDIMENSIONALITY ON MEDICINE INNOVATION

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1. INTRODUCTION

Between 2013 and 2016, the world experienced the largest Ebola epidemiological crisis ever recorded, totaling more than 28,600 cases, with more than 11,000 deaths. Initially focused on forest areas in the interior of Guinea, the epidemic spread rapidly to different West African countries and for the first time recorded cases outside the African continent.

This article aims to identify different dimensions that are projected in a context of Public Health Emergency of International Concern from an analytical approach on the last great outbreak of Ebola, going beyond the biomedical features in an epidemiological scenario. It highlights political and technological subjects that indicate relevant geography fields that are able to develop quickly and that give effective answers for future crisis.

1.1 AN OUTBREAK OVERVIEW

In August 2014, the world was alarmed by the World Health Organization (WHO) statement considering the Ebola outbreak in West Africa as "Public Health Emergency of International Concern".

This section intends to disclose, from relevant institutional data, the geographical spread of Ebola in the last great outbreak. From maps, we present some of the main moments in which the disease changed to a spatially discontinuous phase, reaching areas with high population density.

In this context, it highlights four temporal cuts and strategic actions of different institutions in each epidemiological moment. These temporal cuts consider the numerical and spatial structure of the outbreak, through which an initial moment is highlighted, in a local dimension characterized by a lack of familiarity with the phenomenon. Secondly, a moment of regional dimension can be characterized by institutional actions conducted by national health institutions and international humanitarian institutions. Then a third moment was marked by the geographical spread of the disease to areas of high population density in West Africa. Finally, at the last spread moment, the disease was registered on non-African countries.

2. THE DIFFERENT PATHS IN THE SPATIAL DIMENSION OF EBOLA.

This section focuses on the potential of Geography, as spatial science, to analyze the interface between health and economics fields in its epidemiological dimension.

2.1. THE SPATIAL FEATURES OF AN EPIDEMIOLOGICAL SPREAD: THE EBOLA'S CASE – 2013/2016

This section intends to analyze the spatial spread of Ebola, based on the general features of viral diseases dissemination identified by Haggett (2000). From three epidemiological profiles introduced by Haggett, based on different population sizes, it is concluded that the smaller the population size, the lower the likelihood of a constant epidemic scenario. However, specific features of the first affected territories made the phenomenon possible. In particular: population structures characterized by intense cross-border mobility of three countries; cultural features that allowed the spread of the virus – such as agglomeration habits, burials without adequate

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attention to sanitary care, and contact with the corpse -; eating habits that initially allowed contact between people and the host of the virus; and the poor structure of public health systems in those countries.

2.2 THE ECONOMIC AND TECHNOLOGICAL CHARACTERISTICS RELATED TO THE EBOLA OUTBREAK – 2013/2016

This section begins from the Economic Geography field, under a Political-Regional approach, considering the imbalance inherent in the economic process and the territory; the diversity of actors and the different interests related to the economy; the differentiation of places and spaces; the intersectoral and spatial approach of the economy; and the economic process embedded in large social processes. This analysis can be justified in this field, because it is related to the “territorial constraints that influence the development of innovation – whether in its production or generation, or in its consumption or diffusion - and justify the emergence of particular means that lead to innovation in concrete fields” and, also, related to “the territorial effects of technological innovation, centered on those that directly affect the productive system [...], with particular attention to the creation of a flow space organized by networks at different scales.” (MÉNDEZ, 1997, pp. 159-161).

A triple division is highlighted between those who require support, those who provide financial support, and those who coordinate technical support. Structures for financing actions to combat Ebola through Response, Recovery and R & D actions are analyzed - EBOLA Response Funding (WHO, 2016a). In this way, a great Anglo-Saxon involvement can be identified in the donation composition of this fund. Identifying GOARN - Global Outbreak Alert and Response Network - as an important institutional composition on the Ebola Response, its related structures were analyzed and European institutions were identified as those with the greatest territorial capillarity.

In the dimension of the scientific production of knowledge, understanding that scientific research is an inherent part of technological innovation, we can see the great impact of the epidemic on the number of articles published on Web of Science index journals, with the name “Ebola” on its title – especially after WHO declares the Ebola outbreak in West Africa as “Public Health Emergency of International Concern”. If, on the one hand, before the WHO declaration, there was an average publication of 25 articles / month, on the other hand, after that, there were months with more than 200 published scientific articles.

About this structure of scientific production, which totaled 1917 articles, we highlight the participation of the USA in 967 of these; the United Kingdom's participation in 313; Chinese participation in 159; Canadian participation in 145; French participation in 143; Participation of Switzerland in 117; and German participation in 107. Among the African countries, the participation of Nigeria (64), Sierra Leone (90), Liberia (61) and Guinea (68) stands out.

To improve the analysis of the geographical dimension of the spatial structure of these publications, we highlight the recent publication “Efficacy and effectiveness of an rVSV-vectored vaccine in preventing Ebola virus disease: final results from the Guinea ring vaccination, open-label, cluster-randomised trial (Ebola Ça Suffit!)” (Henao-Restrepo et al, 2017). Thirty-two researchers from eighteen institutions from ten different countries, supported by six institutions from five countries, participated in this study.

3. DISCUSSION

In this sense, it's possible to identify different paths developed from epidemics, namely from Ebola 2013/2016. From there, geography can explore and produce relevant contributions, supporting understanding of this phenomenon and supporting activities in epidemiological contexts.

On this specific context, four relevant moments about the epidemiological, scientific, technological and spatial dimension of the disease were identified. In this specific context, four relevant moments were also identified on the epidemiological, scientific, technological and spatial dimension of the disease.

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