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UNDERSTANDING **EVD** IN WEST AFRICA: EPIDEMIOLOGICAL INVESTIGATION AND COMPUTATIONAL MODELING

Stefano Merler[1]

[1] Fondazione Bruno Kessler, Trento, Italy

merler@fbk.eu

ABSTRACT

The 2014 epidemic of Ebola virus disease in West Africa defines an unprecedented health threat. In July 2014 an outbreak of EVD started in Pujehun district (Sierra Leone) and on January 10th 2015 the district was the first to be declared Ebola-free by local authorities. Here we combine epidemiological investigation and modeling techniques to reconstruct the main characteristics of the outbreak and to evaluate the impact of the implemented intervention measures. Specifically, i) we reconstructed the transmission chain in the district (obtaining information on the main routes of infection transmission and on the distribution of the basic reproduction number); ii) we estimated the key time period of the epidemic (e.g. incubation period, serial interval); iii) we estimated the impact of all intervention measures (e.g. the probability of hospitalization of Ebola cases, the probability of unsafe burials, the percentage of cases detected and isolated through contact investigation); iv) we calibrated a detailed model of EVD transmission informed with all the above information to estimate the impact of all considered interventions in the Pujehun district. This allowed us to clarify the reasons behind the successful local containment of the outbreak and to give quantitative insights into the best options for containing an emerging Ebola epidemic at the source. We will compare these results with our past and ongoing epidemiological investigations in Liberia and Guinea. Finally, we will present estimates of the probability of containment of future Ebola outbreaks by employing different ring vaccination strategies.

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