

Is The Response in Liberia Succeeding? Positive indications

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The number of cases of Ebola in West Africa has been growing exponentially, and projections assume that this dynamic will continue. However, recent case reports from Liberia indicate a change. The number of new confirmed cases reported by WHO has actually diminished for five weeks in a row. The WHO report suggests that this may be due to underreporting under conditions of high levels of stress of the number of cases taking place. Here we report that there appears to be a sound reason for the decreasing number of cases—a change in response strategy that is working. Understanding this dynamic is of critical importance for addressing the outbreak in Sierra Leone and Guinea. In particular the number of cases in Sierra Leone continues to grow exponentially. Discussions with a WHO response coordinator in Liberia indicates that a change in strategy from individual reporting and contact tracing to community based screening for early detection and population wide behavior change happened in mid September.

The WHO reporting of Ebola cases in Liberia (Fig. 1) is showing a rapid decline in the recent weeks from mid September to mid October. The reports do not suggest that this is a success story, rather warning about the limitations of data collection during a period of widespread disease [1]. Still, it is important to note that if the prior rate of growth continued, the number of cases would have more than doubled till the middle of October. Instead, reported cases have decreased dramatically. The number of confirmed cases in particular has declined from a maximum of over 250 in the week ending Sept 7, to approximately 20 in the week ending Oct 12.

From personal communication with WHO Liberia-Monrovia response coordinator Dr. Joa Ja'keno Okech-Ojony, we have learned that this trend may indeed be real. The difference in transmission is attributed to four changes that occurred in mid September that can be responsible for this change:

(1) Door to door screening once or twice per day of neighborhoods for early identification of those with fever for isolation during the critical 72 hour period after symptoms begin to prevent contact and transmission.

(2) Community teams, that know each individual and are going door to door.

(3) Public awareness and recognition of the danger and associated behavioral changes that are needed to prevent transmission.

(4) Global intervention partners, i.e. larger resources available from the international community for the response, including the construction of Emergency Treatment Units (ETUs).

He notes that the primary difficulty continues to be the high density and contact rates in the urban environment of Monrovia which present significantly greater challenges for screening and isolation.

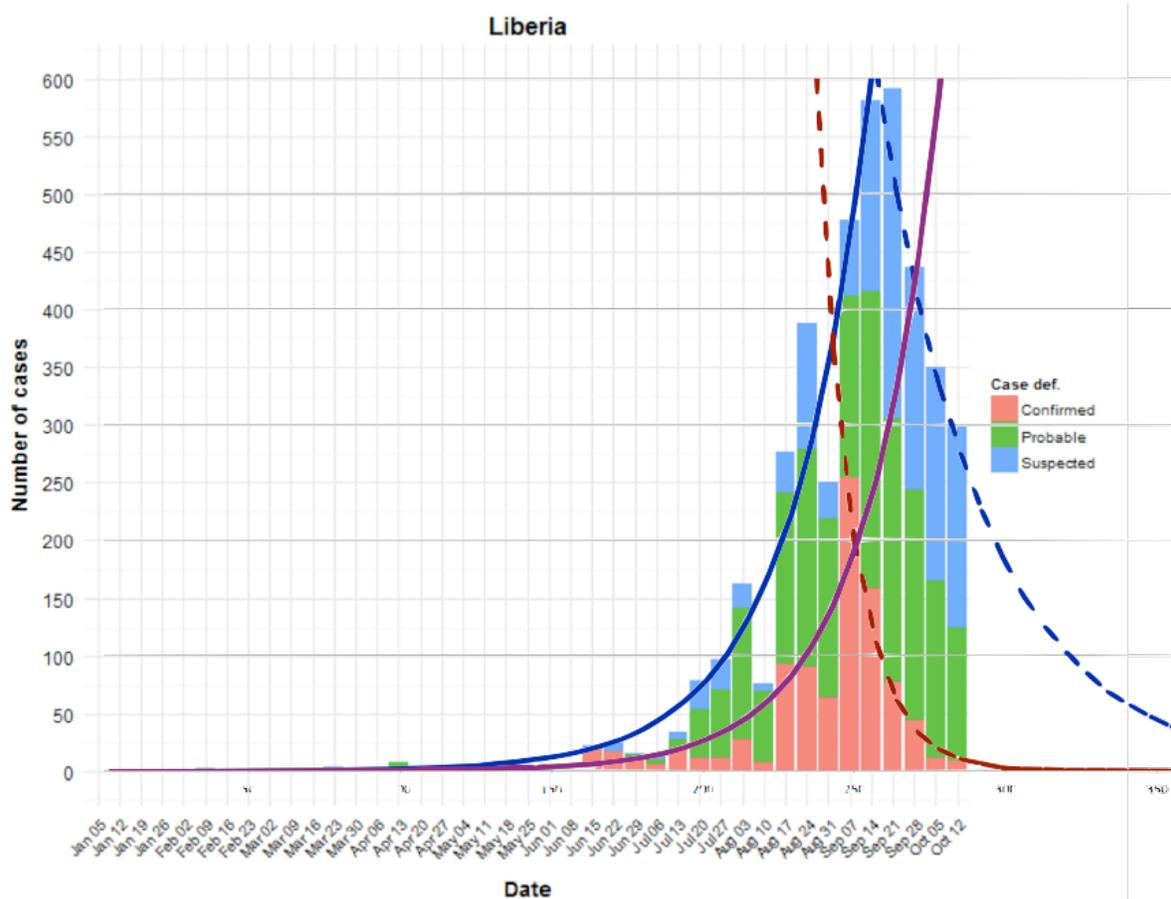


Figure 1: Liberia counts of Ebola cases (confirmed, probable and suspected) reported by the Ministries of Health up to the end of 11 October, as graphed by the WHO [1]. Exponential growth curves (solid) and declines (dashed) give doubling times for increases between 2 to 3 weeks. For the declining period total cases are reduced by a factor of 2 in 3-4 weeks, while confirmed cases decrease by a factor of 2 every week. Cases are declining but less rapidly in Monrovia so the decline in number of cases may slow as the residual cases become concentrated in the city.

These methods confirm the effectiveness of key concepts of a recent proposal put forth by the New England Complex Systems Institute for response to Ebola in West Africa [2]. Community based screening for early detection and population wide behavioral change are strategies that are fundamentally different from the traditional accepted response method in which individual reports of disease are followed by contact tracing. While specific adverse cultural behaviors, e.g. burial practices, are often mentioned, general public behavioral change is not discussed as integral to the response [3]. We are pleased that the national response anticipated our proposal and appears to be succeeding.

The implications are that the current dynamic actually corresponds to a change in the transmission rate and thus an exponential decline in number of new cases. Fitted values of the exponential increase and decline are indicated in Figure 1.

We note in contrast that the conditions in Sierra Leone continue to deteriorate, See Fig. 2. Understanding the mechanisms for success in Liberia may inform the efforts to contain the disease in Sierra Leone and Guinea, as well as strategies for future outbreaks.

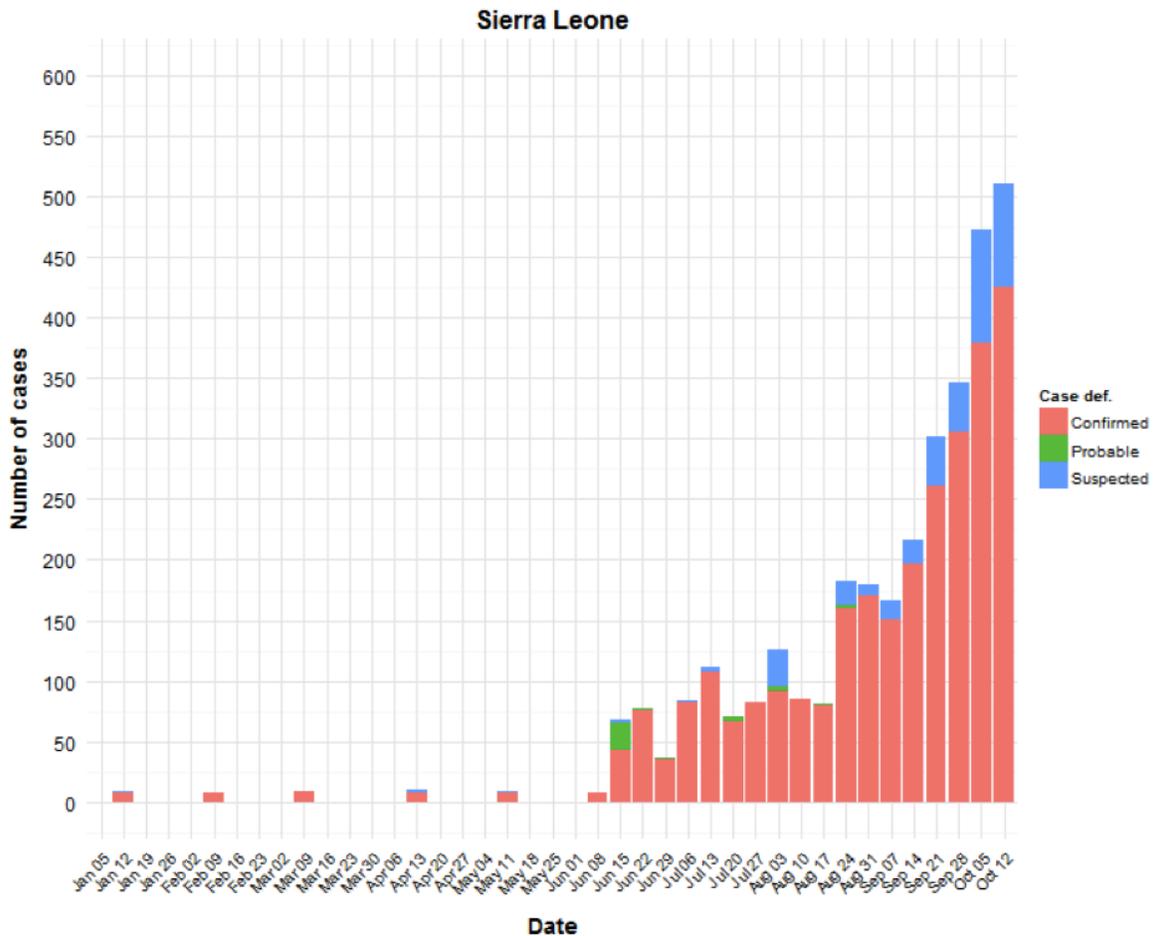


Figure 2: Sierra Leone counts of Ebola cases (confirmed, probable and suspected) reported by the Ministries of Health up to the end of 12 October, as graphed by the WHO [1].

References:

[1] WHO: Ebola Response Roadmap Situation Report, 15 October 2014, World Health Organization (2014). <http://www.who.int/csr/disease/ebola/situation-reports/en/>

[2] Y. Bar-Yam, DRAFT New Ebola Response Strategy: Local Care Team Early Detection Response, NECSI (October 12, 2014). <http://necsi.edu/research/management/health/ebolaresponse.html>

[3] see e.g. Ebola virus disease outbreak, Overview of needs and requirements UNMEER (2014). http://reliefweb.int/sites/reliefweb.int/files/resources/Ebola_outbreak_Sep_2014.pdf