Supplementary Appendix 1

This appendix has been provided by the authors to give readers additional information about their work.

Supplement to: WHO Ebola Response Team. Ebola virus disease in West Africa — the first 9 months of the epidemic and forward projections. N Engl J Med 2014;371:1481-95. DOI: 10.1056/NEJMoa1411100

Supplementary Appendix

Ebola Virus Disease in West Africa—the First 9 Months of the Epidemic and Forward Projections

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WHO Ebola Response Team

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Contents

Data Sources

Using a standard Ebola virus disease (EVD) case investigation forms (see Supplementary Documents), clinical and demographic data were collected from confirmed, probable and suspected EVD cases identified in Guinea, Liberia, Nigeria, and Sierra Leone. To create the fullest possible picture of the unfolding epidemic, these data were supplemented by information collected in informal case reports, data from diagnostic laboratories, and from burials. The data recorded for each case include: district of residence, district of disease report, age, sex, signs and symptoms recorded between onset and clinical presentation, date of symptom onset, name of hospital and date of hospitalization, and date of death or discharge. A subset of cases provided information on potentially infectious contacts with other EVD cases, including possible exposure at funerals.

Data Cleaning

The datasets from individual countries were combined and cleaned to correct spelling errors in text fields. Date variables were cleaned by checking for consistency in date recording. The predominant format of date recording was day/month/year, but for some cases day and month were switched. Where this could be ascertained (e.g., any records with an entry after September 2014, or before March 2014 in Liberia or Sierra Leone, or before August 2014 in Nigeria), day and month were switched. Furthermore, dates prior to the beginning of the epidemic late November 2013 and dates after the date of the database (14 Sep 2014) were removed.

Delays between key events in disease progression were evaluated for each patient, and unrealistic delays flagged. These unrealistic delays included negative onset-to-notification delays, negative onset-to-hospitalization, negative onset-to-death, negative onset-to-discharge, negative hospitalization-to-discharge and negative hospitalization-to-death delays. Delays larger than 60 days for the following variables were also flagged: onset-to-hospitalization, onset-to-death, notification-to-hospitalization, notification-to-death, notification-to-discharge and hospitalization-to-death. For individuals with these unrealistic delays, the delay as well as the date variable with the date considered less reliably recorded were set to missing. The numbers of unrealistic delays which led to date exclusions are provided in Table S1.

We inferred dates of onset and notification for patients where these were missing based on information learned from cases with complete date records. For example, for a person with missing onset date but recorded notification date, we inferred the onset date to have been x days prior to the notification date, where x was the country-specific median observed delay between onset and notification dates for patients where both dates were recorded. For countries with less than 10 patients who had both required dates recorded, the overall median across all countries was used instead. We considered the date of notification to be most reliable, followed by date of hospitalization, date of death, date of discharge, date of isolation, date of symptom onset and date of outcome completion, in that order. Hence for inferring dates of symptom onset, we used the following set of rules:

- If the date of notification was available then we inferred the date of symptom onset as the date of notification minus the median onset-to-notification delay.
- Otherwise, if the date of hospitalization was available then we inferred the date of symptom onset as the date of hospitalization minus the median onset-to-hospitalization delay.

- Otherwise, if the date of death was available then we inferred the date of symptom onset as the date of death minus the median onset-to-death delay.
- Otherwise, if the date of hospital discharge was available then we inferred the date of symptom onset as the date of hospital discharge minus the median onset-to-hospital-discharge delay.
- Otherwise, if the date of isolation was available then we inferred the date of symptom onset as the date of isolation minus the median onset-to-isolation delay.
- Otherwise and finally, if the date of outcome completion was available then we inferred the date of symptom onset as the date of outcome completion minus the median onset-to-outcome-completion delay (unless sample size <10 and then the overall median is used).

For inferring dates of notification, we similarly used dates of hospitalization, death, hospital discharge, isolation, symptom onset, and outcome completion dates, in that order of preference.

District of onset was used whenever available, in 2455 cases out of 4020 confirmed/probable cases (61%). For the remaining 1565 cases, the district of residence was used as a proxy for the district of onset. Careful cross-checking allowed us to filter out erroneous district names. Overall, district information could be retrieved for a majority of confirmed/probable cases (3660 cases out of 4020, 91%).

Table S1. Frequency of unrealistic inter-event delays that were excluded from the dataset.

	negative delays*				long delays* (>60 days)			
	Guinea	Liberia	Nigeria	Sierra Leone	Guinea	Liberia	Nigeria	Sierra Leone
Onset-to-notification	6	53	2	30	NA	NA	NA	NA
Onset-to-hospitalization	3	24	2	21	0	2	0	3
Onset-to-death	0	8	0	6	1	2	0	3
Onset-to-discharge	0	0	0	0	NA	NA	NA	NA
Notification-to-hospitalization	NA	NA	NA	NA	0	0	0	0
Notification-to-death	NA	NA	NA	NA	0	0	0	0
Notification-to-discharge	NA	NA	NA	NA	0	2	0	0
Hospitalization-to-death	6	11	0	1	0	0	0	0
Hospitalization-to-discharge	0	0	0	0	NA	NA	NA	NA

*NA indicates contexts in which negative or long delays are not considered unreasonable.

District-level Synchrony

The countries of Guinea, Sierra Leone and Liberia can be divided into 67 administrative districts, with: 38 in Guinea, 15 in Liberia and 14 in Sierra Leone. Of the 3311 cases with reported or inferred onset times and known districts, 3106 were recorded in the 20 most affected districts. Of these 20 most affected districts, 6 were in Liberia, 7 were in Sierra Leone and 7 were in Guinea.

Patterns of correlation between the 20 districts with the highest reported case incidence suggest that district epidemics can be separated into four types at the current time.

1. **Little activity followed by clear recent accelerating growth of incidence.** Of the 20 districts with the largest outbreaks, 15 formed a coherent group in which there was little activity prior to week 20 (12 May 2014) but sustained high growth since then (Figure S1). The coherence of this sub-epidemic was strongest to the south with the 10 most southerly districts – either clustered around Montserrado or adjacent to Gueckedou -- showing very high degrees of correlation in their case incidence. 19% of all confirmed and probable cases have been reported from Montserrado. Kerouane is included in this group.
2. **Sustained transmission but no accelerating growth of incidence.** Two of the 20 most affected districts, Gueckedou and Ratoma, have been experiencing apparently independent outbreaks with sustained incidence since earlier in 2014 but without any reported period of sustained growth. Gueckedou is a province of Guinea adjacent to both Liberia and Sierra Leone in which the epidemic originated[1]. Ratoma, one of the five municipal communes of Conakry, was the first urban population to report cases.
3. **Sustained transmission and recent accelerating growth of incidence.** Case incidence for Macenta in southern Guinea, also one of the earliest affected districts, appears to be a combination of these first two epidemic types with a series of early outbreaks and then a recent sudden increase in cases.
4. **Decline in incidence.** Finally, Boffa and Telimele in Sierra Leone, appear to have experienced a linked but aborted take-off. These two districts (the most northerly of the 20 most affected districts) have incidence that is weakly negatively correlated with the southern outbreaks but positively correlated with each other. In these districts, incidence was decreasing around week 20, a period during which incidence was increasing elsewhere.

We also estimated how the correlation of incidence changed, on average, as a function of distance (Figure S2). Although there is some evidence of a continuous trend of decreasing correlation with distance, the average level of correlation across the entire affected region was high and local effects are only significantly different from the global average correlation for relatively short distances. The strength of association between correlation of incidence and distance was reduced when lags of 1 and 2 weeks were considered.

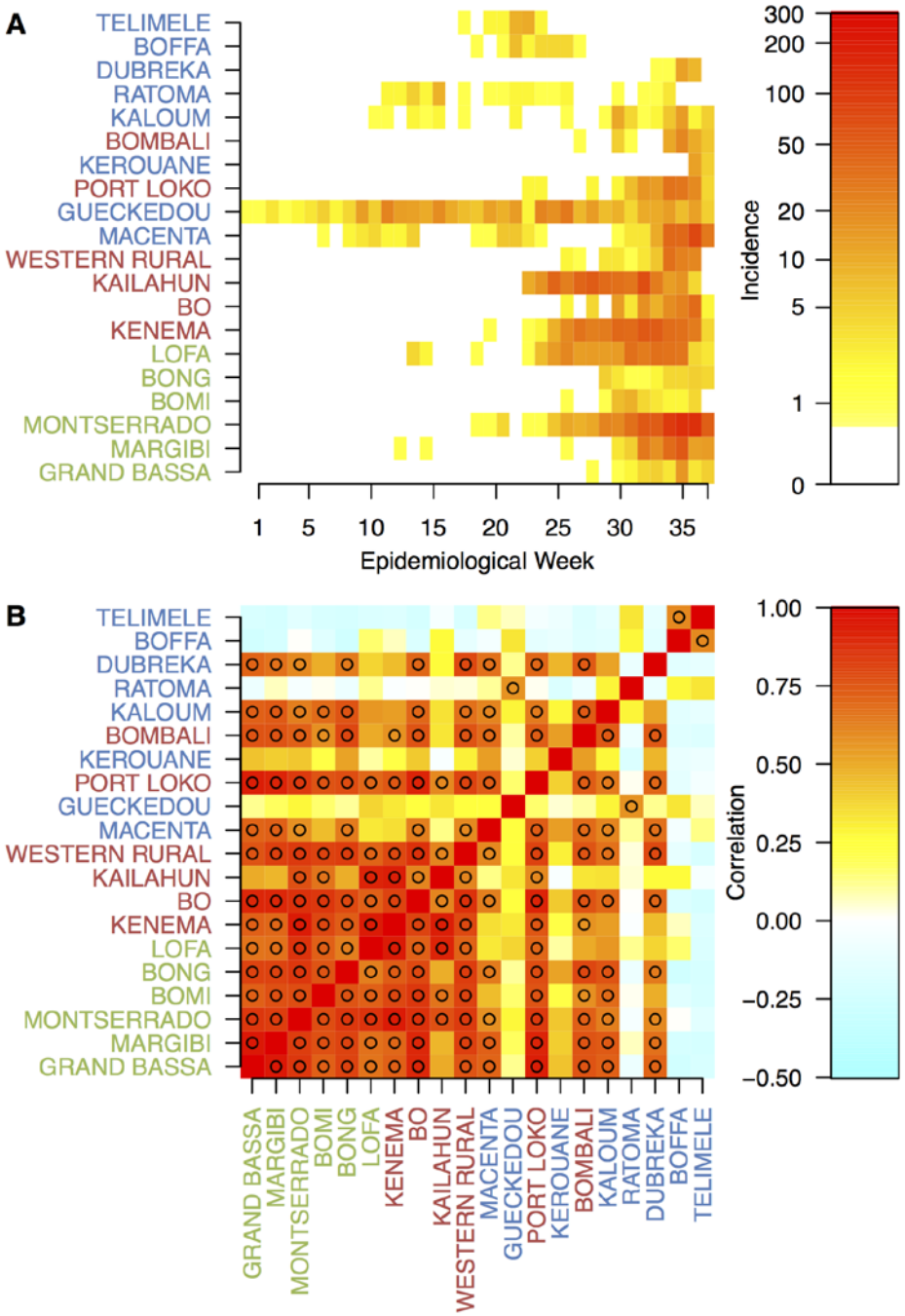

Figure S1. District-level weekly incidence of confirmed and probable cases (A) and correlation between log-transformed district-level weekly incidence of confirmed and probable cases for the 20 most affected districts. In B, coefficients are indicated by colour and were calculated using Pearson correlation coefficients[2] using the rcorr function of the R package Hmisc version 3.12-2. Significant correlations are indicated with an open circle adjusting for multiple comparisons using the Bonferroni correction. Districts are arranged by increasing latitude (South to North) from left to right and bottom to top, with colours indicating country (blue – Guinea, green – Liberia, and red – Sierra Leone).

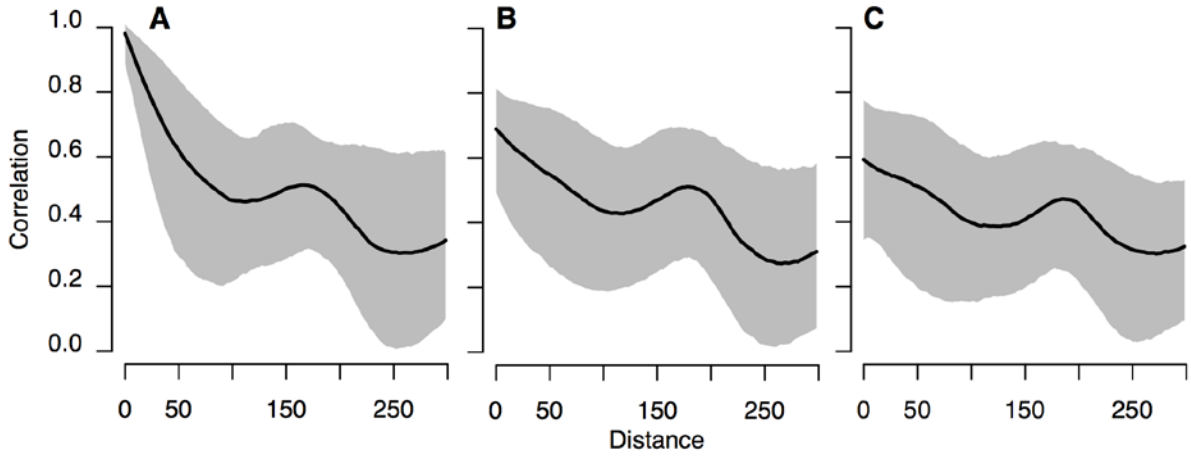

Figure S2. Spline correlogram showing multiple possible peaks in the distance correlation between affected districts with no lag (A), 1-week lag (B) and 2-week lag (C). All cases were assigned to the latitude and longitude of the centroid of the district in which they occurred. The spline correlogram (solid line) and confidence region (grey region) were estimated using the Sncf function of the R-package ncf (version 1.1-5) for all district pairs[2]. However, results are only shown for the first 300km of the maximum, ~600 km separation. A spline with 10 degrees of freedom was used to calculate the function shown here. No additional features were observed when the degrees of freedom of the spline were increased up to 20 (not shown).

Incubation Period

In order to obtain information on the incubation period, recorded dates of contact between confirmed or probable EVD cases and funeral attendance were analysed. There were 486 cases who had 1 or more live contacts but no reported funeral contacts, 67 cases with one or two funeral contacts but no live contacts, and 148 cases with both funeral and live contacts reported. To estimate the incubation period distribution, we considered three different inclusion criteria: (i) only including people who had a single reported day of potential exposure and (ii) only including people who had more than one reported potential exposure day. Cases without recorded onset date were excluded even if their approximate onset date could be inferred based on other recorded dates. We also explored the effect of excluding short delays between exposure and onset for reasons of biological implausibility and since the data are likely biased towards shorter exposures due to recall bias.

In the EVD databases, up to 3 different contacts and up to 2 different funerals were recorded per confirmed or probable case. For contacts with both living EVD cases and deceased EVD cases at funerals, the start and end date of the contact were recorded, with the start date generally much more frequently recorded than the end date. For contacts with living EVD cases, when only the start date was given, we assumed a 1-day contact window (that is, contact only occurred on the one date provided). If only the end date was given, the earliest exposure we considered was 42 days before the onset date (twice the assumed maximum incubation period). For funeral contacts, if only the start date or only the end date of contact were given, we assumed the duration of exposure was one

day. For each EVD case, we considered all dates of potential exposure recorded and calculated the delay between these and the onset date. Contacts on dates after the onset date were excluded.

For fitting gamma distributions to all non-negative recorded potential exposure days we calculated the log-likelihood

$$\ln L = \sum_i \ln \sum_j \gamma\left(d_{ij} + 0.5 \mid \alpha, \beta\right)$$

where i indexes individuals and j indexes the potential exposure days for each individuals, γ is the probability density function of the gamma distribution with shape and rate parameters α and β, respectively. d_{ij} is the recorded period between exposure and onset. We added a half day to each exposure delay (the mid-point of a day) to account for the fact that each such delay was rounded to an integer number of days.

We defined a censored log-likelihood, fitting only to the observed incubation periods longer than a specified cut-off for censoring, d_0, by re-normalising the distribution:

$$\ln L = \sum_i \ln \sum_{j:d_{ij}>d_0} \frac{\gamma\left((d_{ij} + 0.5 \mid \alpha, \beta)\right)}{1 - \Gamma(d_0 \mid \alpha, \beta)}$$

where delays less or equal to d_0 are censored.. Γ is the cumulative distribution function of the gamma distribution with parameters α and β.

The fits to data from confirmed and probable cases reporting single day or multiday exposure are shown in Figure S3 and detailed in Table S2.

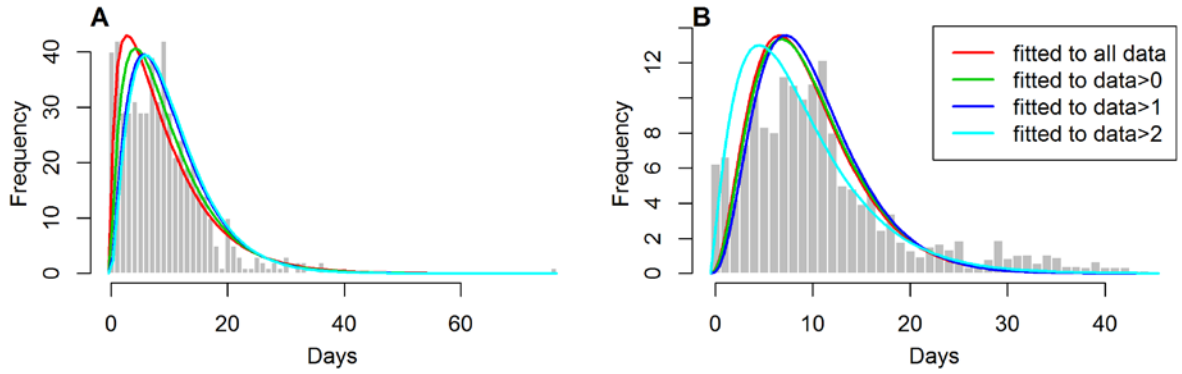

Figure S3: Gamma parametric fits to the distributions of incubation periods among confirmed and probable EVD cases reporting (A) single day and (B) multiday exposures.

Table S2. Sample sizes, observed medians, means and standard deviations (SDs) and means, SDs, shape and rate parameters of gamma distributions fitted to the data, including confirmed and probable cases reporting single day or multiday exposures.

		observed				fitted			
	Fitting to	Sample Size[#]	Median *	Mean *	SD	Mean	SD	Shape	Rate
single day exposure	all delays	540	8	8.7	7.5	8.7	7.7	1.41	0.154
	delays >0 days	500	8	9.4	7.4	9.1	7.3	1.75	0.182
	delays >1 days	458	9	10.2	7.2	9.7	6.9	2.21	0.216
	delays >2 days	429	9	10.7	7.2	9.9	6.8	2.34	0.225
multiday exposure	all delays	161	9	11	NA	9.5	5.5	3.39	0.338
	delays >0 days	155	9.5	11.4	NA	9.7	5.5	3.44	0.336
	delays >1 days	147	9.5	11.9	NA	9.9	5.4	3.8	0.364
	delays >2 days	71	9.5	12.8	NA	8.8	6.3	2.18	0.236

[#]Number of individuals, not exposure days. *For multiday exposures the observed means were calculated by calculating the mean of the individual means for each person to ensure equal weighting of all individuals. The median was similarly obtained by calculating the median of the individual medians for each person.

We explored the sensitivity of the results to the extreme assumption that infection happened on the first reported contact, that is, the one longest before the onset of symptoms. This had the expected effect of increasing both the mean and the standard deviation of the fitted gamma distribution from the 9.7 and 5.5 days to 15.5 and 9.4, respectively, among those cases reporting multiday exposures excluding data at zero days.

Table S3 describes the incubation period distribution estimated from confirmed, probable and suspected cases reporting multiday exposures (to be compared with Table 2 in the main text which presents the corresponding values for the observed data including confirmed and probable cases only).

Table S3. Mean and standard deviation (SD) incubation period in days among those confirmed, probable and suspected cases reporting multiday exposures excluding data at zero days, overall.

Exposures		Mean*	SD
Single day exposure	Observed	9.4	7.3
	Fitted	9.1	7.3
Multiday exposure	Observed	11.8	NA
	Fitted	10.2	6.0

*The observed mean for multiday exposure was obtained by calculating the mean across all cases of the individual mean delay from exposure to onset

Serial Interval and Generation Time

Observed serial intervals were extracted from the database by linking contacts specified by individual cases with case records for these contacts to calculate the delay from onset to onset. Contacts could either be made with cases while they were alive, or during funerals. We only included data on patients who had only named a single contact, cases and contacts without a recorded onset date were excluded, even if their approximate onset date could be inferred based on other recorded dates: this gave serial intervals from 162 cases with a live contact and 16 cases with a funeral contact. We fitted a gamma distribution to these observed serial intervals by maximum likelihood.

The generation time is the time from the infection of the index case (denoted t_1) until the infection of a case infected by that index (denoted t_2). However, the dates of these events are not typically known. It is often possible to determine the serial interval, defined as the time from the onset of symptoms in the index case (denoted o_1) until the onset of symptoms in the case infected by that index (denoted o_2). The time from infection to onset within case i is the incubation period, denoted $i_i = o_i - t_i$. Thus,

$$o_i = t_i + i_i$$

The serial interval for cases 1 and 2 is thus $o_2 - o_1$, whereas the generation time for cases 1 and 2 is $t_2 - t_1$. Thus,

$$o_2 - o_1 = (o_2 - i_2) + (i_2 - o_1)$$

and similarly,

$$i_2 - i_1 = (i_2 - o_1) + (o_1 - i_1).$$

If the timing of infectiousness in an EVD infected individual is correlated with the timing of disease onset in that case (i.e. if infectiousness begins on or around the time of symptom onset), it is reasonable to treat the time from the time of symptom onset in case 1 to the time of infection of case 2 (i_2-o_1) as independent of the incubation period (o_i-i_i). Then from the equations above, we see that both the serial interval and the generation time have the same distribution. For more general results on serial interval and generation time distributions, see Svensson[3].

Inter-event Delay Distributions

Gamma distributions were fitted to

- time from symptom onset to hospitalization,
- time from symptom onset to discharge,
- time from symptom onset to death,
- time from symptom onset to notification,
- time from notification to discharge,
- time from notification to death,
- time from hospitalization to discharge and
- time from hospitalization to death,

For all delay distributions cases without the relevant dates recorded were excluded from these analyses even if the approximate dates could be inferred based on other recorded dates. Overall and country-specific estimates were obtained (Figures S4 and S5).

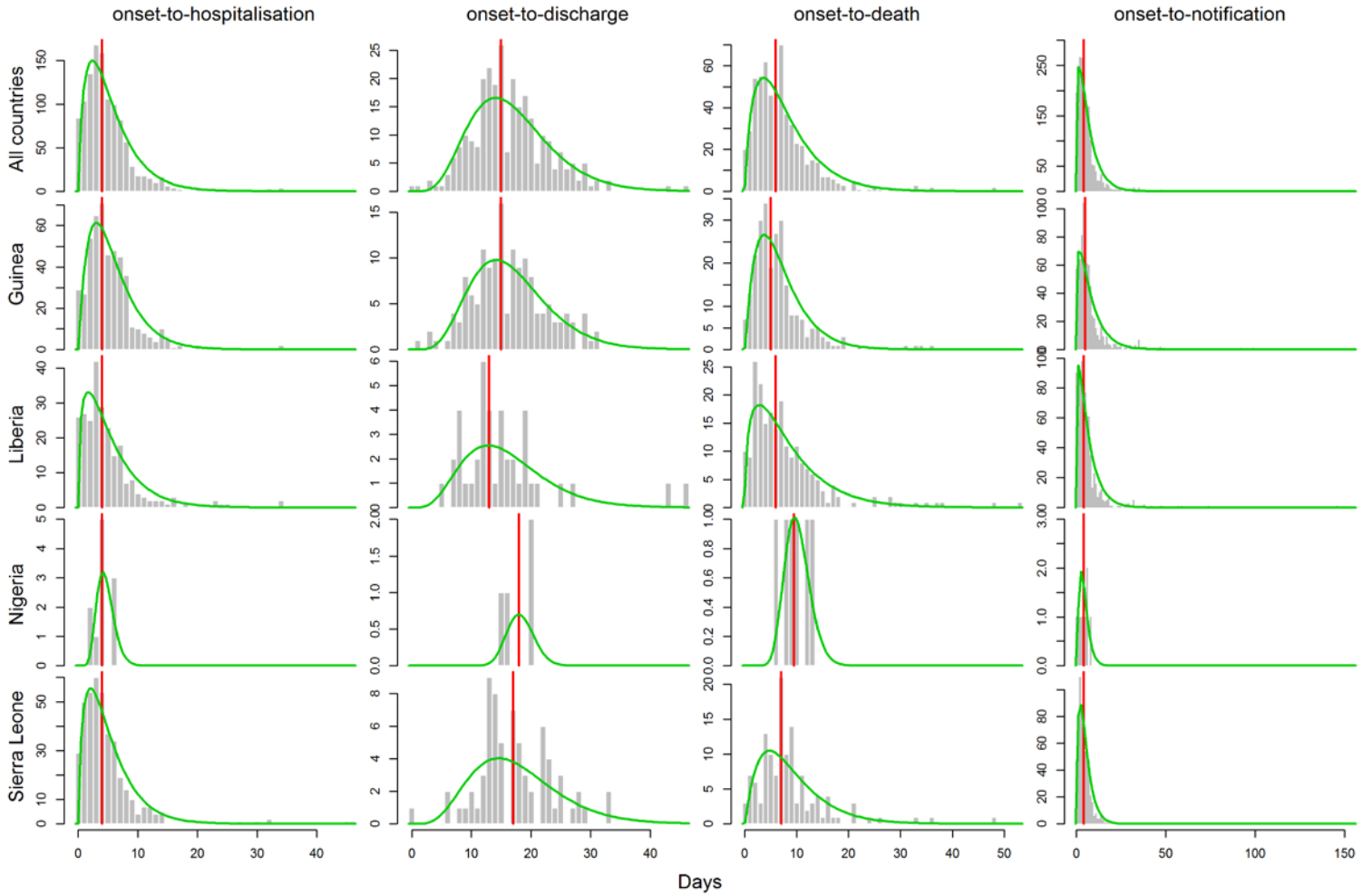

Figure S4. Gamma distribution parametric fits (green line) to the distributions of time from symptom onset to hospitalization, symptom onset to discharge, symptom onset to death and symptom onset to notification, overall and by country. The red line shows the median of the observed data, and the bars show the observed data.

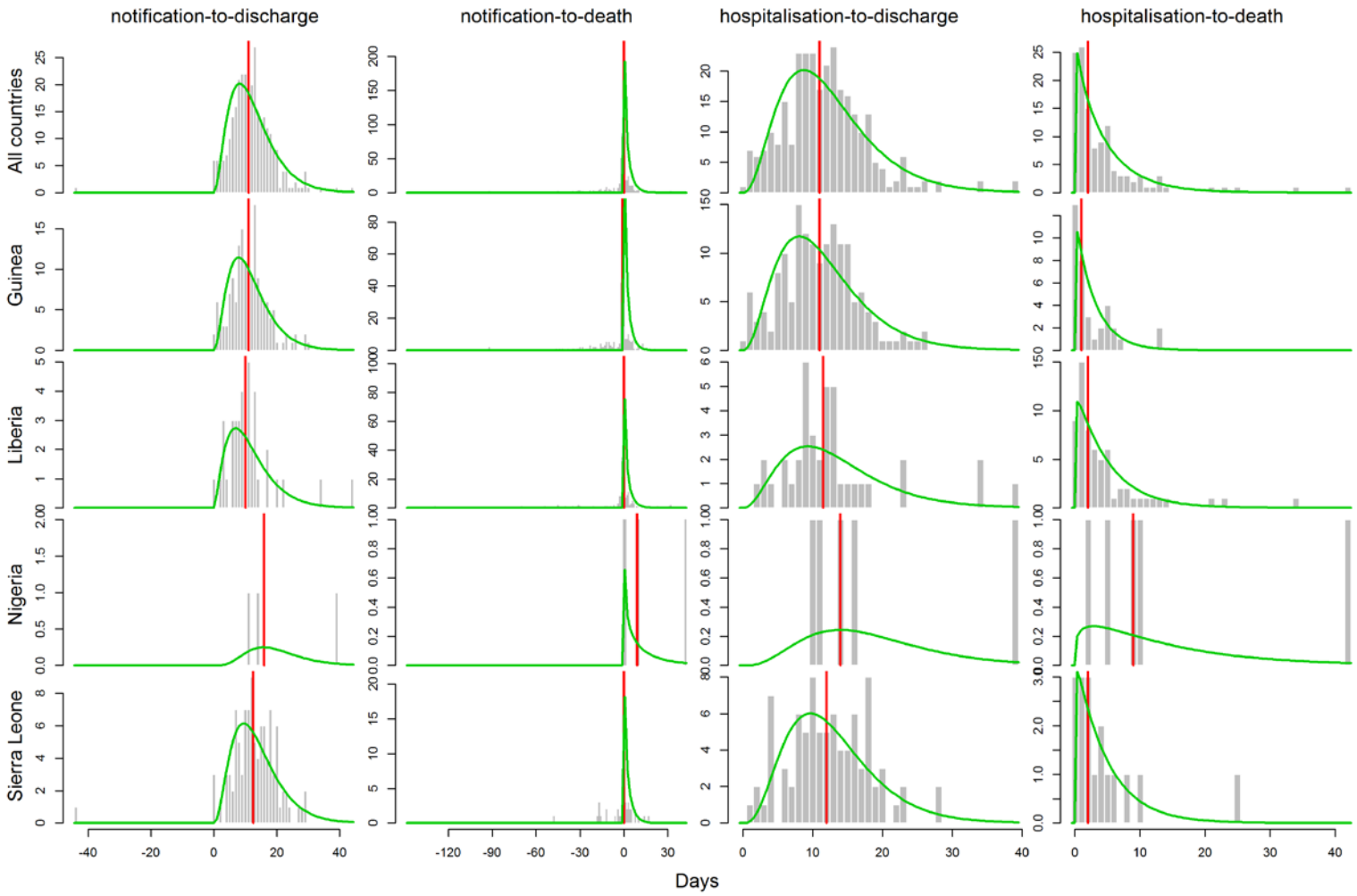

Figure S5. Gamma distribution parametric fits (green line) to the distributions of time from notification to discharge, notification to death, hospitalization to discharge and hospitalization to death, overall and by country. The red line shows the median of the observed data, and the bars show the observed data.

Case Fatality Rate

The case fatality rate (CFR) is defined as the percentage of cases which are fatal. When estimating this during an ongoing epidemic, the naïve method of dividing the number of deaths reported to date by the number of cases reported to date will be biased downwards due to the fact that among cases reported recently there may be a substantial number who are currently still sick some of who will die in the future. As these are counted in the cases, but not yet in the deaths, the estimate will be biased downwards. There are a number ways to prevent this bias from happening depending on the type of data available.

We estimated the CFR from data for the 46% of cases with recorded definitive clinical outcomes. Naïve estimates of the CFR derived from the ratio of recorded deaths to recorded cases significantly under-estimate the true CFR seen in this EVD epidemic, since the final clinical outcome of over half of the reported cases is not known. Such estimates can be corrected for the delay between case onset and date of death which can otherwise bias ratio-based estimates when incidence is non-stationary[1].

In addition to estimating the CFR based on all the information available to date, we estimated the CFR over time based on the cases which had onset by a particular date, demonstrating how information has accumulated over time, resulting in narrowing confidence intervals. Figure S6 shows the trends over time in the CFR calculated according to the different methods. When using final status and excluding those with missing information (panel A), the adjustment for the delay in outcome reporting is not necessary, and the CFR estimates appear fairly stable over time in recent weeks. When the estimates are based on the current status and missing information is interpreted as alive, without the delay adjustment (panel B), the estimates in recent weeks are clearly biased downwards, and the confidence intervals do not capture the delay biases. However, when adjusting for the reporting delays (panel C), the estimates appear stabilised, although at a different level compared to the final status. While the estimates based on final status are fairly consistent between countries, and at around 70% similar to what has previously been reported for Ebola Zaire, the adjusted estimates using the current status are considerably lower in Liberia and Sierra Leone. While often the reporting of deaths is more complete than the reporting of recoveries, typically biasing estimates of the case fatality rate upwards, in the current situation it may well be that deaths are missed as easily as recoveries as they are lost to follow up, for instance if case move back to their home villages where a substantial proportion might die.

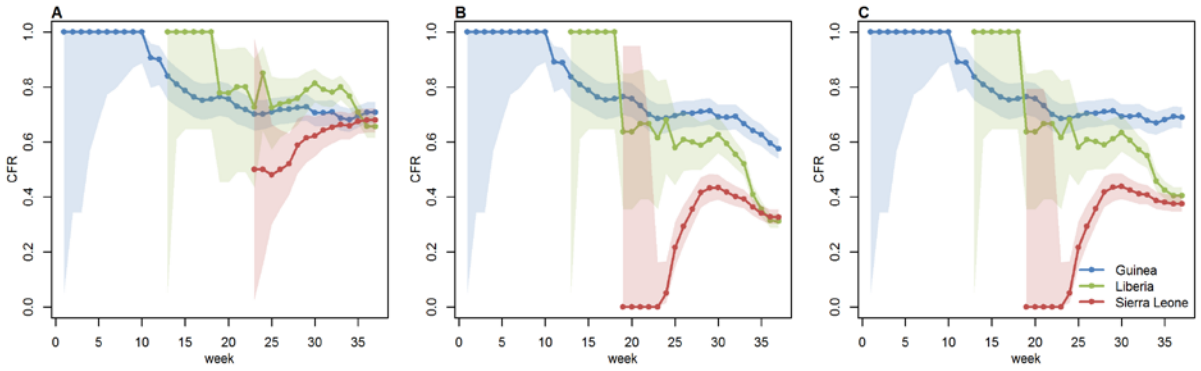

Figure S6. Cumulative CFR estimate (95% CIs) of confirmed and probable cases over time by country. (A) based on definitive clinical outcome, dividing total deaths by total cases with known final outcome (death or recovery), (B) naïve estimate, dividing total deaths by total cases (irrespective of outcome), and (C) the naïve estimate adjusted for the delay between case and death reporting[4].

For comparison with Table 2 of the main text (which presented CFR estimates for confirmed and probable cases), we estimated the CFR for confirmed, probable and suspected cases (Table S4).

Table S4. CFR (Point Estimate, 95% Confidence Interval and sample size n) estimates for Confirmed, Probable and Suspected EVD Cases by Country. All estimates based on recorded definitive outcome other than top row. --- = n<10 and CFR not calculated

	All countries	Guinea	Liberia	Nigeria	Sierra Leone
All cases (based on current status)	38.4 (37.1, 39.8; n = 4894)	55.3 (51.6, 59; n = 705)	39 (37.1, 40.9; n = 2487)	35.3 (17.3, 58.7; n = 17)	30.6 (28.4, 32.8; n = 1685)
All cases (based on definitive outcome)	73.6 (71.7, 75.4; n = 2250)	70.7 (66.8, 74.4; n = 543)	75.8 (73.3, 78.2; n = 1196)	45.5 (21.3, 72; n = 11)	72 (67.9, 75.8; n = 500)
All hospitalized cases (based on definitive outcome)	64.2 (61.6, 66.8; n = 1303)	64.7 (60.2, 69; n = 451)	65.6 (61.3, 69.6; n = 497)	40.0 (16.8, 68.7; n = 10)	62.3 (57.1, 67.3; n = 345)
By gender					
male	75.2 (72.6, 77.6; n = 1153)	68.6 (62.7, 74; n = 255)	78.1 (74.8, 81.1; n = 644)	---	74.8 (69.1, 79.8; n = 250)
female	71.9 (69.1, 74.5; n = 1028)	72.7 (67.3, 77.6; n = 286)	74.1 (70.1, 77.7; n = 510)	---	66.7 (60.3, 72.5; n = 225)
By age group					
<15 yrs	74.3 (68.7, 79.2; n = 261)	78.1 (67.3, 86; n = 73)	71.8 (63, 79.2; n = 117)	---	74.6 (63.4, 83.3; n = 71)
15-44 yrs	69.2 (66.7, 71.7; n = 1303)	65 (59.6, 70; n = 320)	73.6 (70.2, 76.8; n = 686)	---	64.5 (58.8, 69.8; n = 290)
>44 yrs	81.3 (77.7, 84.4; n = 518)	78.6 (71.1, 84.6; n = 140)	81.7 (76.7, 85.9; n = 268)	---	84 (75.8, 89.7; n = 106)
By occupation					
HCW	69 (62, 75.2; n = 187)	56.1 (41, 70.1; n = 41)	76.5 (66.2, 84.4; n = 81)	---	69 (56.2, 79.4; n = 58)
non-HCW	74 (72.1, 75.9; n = 2063)	71.9 (67.8, 75.7; n = 502)	75.8 (73.2, 78.2; n = 1115)	---	72.4 (68.1, 76.4; n = 442)

Risk Factors for Death

To identify risk factors for death, odd ratios were computed for all available symptom data, with or without accounting for differences between countries, using logistic regression. Only symptoms for which at least 5 observations were present in each category were considered. Each symptom is analysed independently. When accounting for differences between countries, the country of onset was included as a first covariate, before including the symptom effect. All models were fitted using the function 'glm' in the *R* software[3]. The significance of individual symptom effects was assessed using likelihood ratio tests. Results based on the analysis of all data combined are given in the main text, while Table S5 gives country-specific results for the 3 most affected countries.

Table S5: Demographic Characteristics, Signs and Symptoms among Confirmed and Probable Ebola Cases by Country, as of 14 September 2014

	Guinea				Liberia				Sierra Leone			
	OR	95%CI		p	OR	95%CI		p	OR	95%CI		p
Variable		Lower	Upper	value		Lower	Upper	value		Lower	Upper	value
Gender	1.28	0.88	1.87	0.2	0.81	0.5	1.29	0.37	0.71	0.46	1.09	0.11
Age Group												
<15 years old	1.45	0.8	2.77	0.23	0.76	0.4	1.49	0.41	1.36	0.75	2.57	0.32
15-44 years old	0.5	0.33	0.75	0	0.58	0.34	0.97	0.04	0.39	0.24	0.63	0
≥45 years old	1.91	1.22	3.07	0	2.82	1.46	6.01	0	3.18	1.71	6.29	0
General symptoms												
Fever	0.46	0.24	0.87	0.02	1.38	0.66	3.26	0.41	1.07	0.58	2.05	0.82
Fatigue	1.93	1.12	3.28	0.02	0.69	0.2	1.87	0.49	1.09	0.58	2.02	0.78
Loss of appetite	0.66	0.37	1.12	0.13	1.41	0.76	2.55	0.27	0.96	0.57	1.58	0.87
Vomiting	0.9	0.56	1.43	0.66	1.18	0.67	2.06	0.56	0.81	0.48	1.32	0.39
Diarrhea	1.93	1.22	3.04	0.01	1.18	0.63	2.12	0.6	0.74	0.46	1.18	0.21
Headache	1.71	1.06	2.74	0.03	1.58	0.9	2.74	0.11	1.09	0.68	1.74	0.73
Abdominal Pain	1.05	0.66	1.65	0.85	1.06	0.61	1.83	0.83	0.94	0.59	1.49	0.78
Muscle Pain	0.87	0.54	1.43	0.59	0.94	0.55	1.6	0.82	0.76	0.48	1.21	0.25
Joint Pain	1.07	0.64	1.8	0.81	1.47	0.85	2.59	0.17	1.19	0.73	1.95	0.49
Chest Pain	1.23	0.7	2.21	0.48	1.09	0.63	1.91	0.76	1.58	0.99	2.56	0.06
Cough	0.77	0.24	2.56	0.67	1.78	1.01	3.24	0.05	1.53	0.93	2.57	0.1
Difficulty Breathing	3.56	0.83	19	0.09	1.71	0.89	3.53	0.11	1.54	0.93	2.61	0.1
Difficulty Swallowing	2.06	0.51	10.5	0.32	2.21	1.11	4.83	0.02	1.32	0.74	2.45	0.35
Conjunctivitis	5	1.32	24.8	0.02	1.91	0.99	3.94	0.05	2.06	1.03	4.27	0.04
Sore Throat	1.39	0.42	4.92	0.6	0.89	0.44	1.87	0.74	3.8	1.92	8.25	0
Confused	---	---	---	---	1.69	0.79	4.05	0.19	1.59	0.74	3.59	0.24
Hiccups	---	---	---	---	5.25	1.54	32.9	0.01	1.07	0.55	2.19	0.84
Jaundice	2.05	0.89	5.57	0.09	2.97	0.84	18.9	0.1	2	0.95	4.62	0.07
Eye Pain	---	---	---	---	6.36	1.3	115	0.02	1.29	0.64	2.74	0.49
Rash	---	---	---	---	4.88	0.97	88.8	0.06	1.52	0.68	3.76	0.32
Coma/Unconscious	---	---	---	---	0.72	0.24	2.67	0.59	5.19	1.46	33.1	0.01
General symptoms	---	---	---	---	6.06	1.23	110	0.02	3.33	0.89	21.7	0.08
Hemorrhagic Symptoms												
Unexplained bleeding	2.24	1.17	4.69	0.01	1.78	0.76	4.87	0.19	1.26	0.6	2.79	0.55
Hematemesis	---	---	---	---	1.83	0.49	11.9	0.4	0.13	0.01	0.91	0.04
Blood in Stool	0.85	0.31	2.73	0.77	1.11	0.34	4.96	0.87	1.03	0.34	3.42	0.97
Bleeding Gums	---	---	---	---	2.62	0.49	48.5	0.3	---	---	---	---
Bloody Nose	---	---	---	---	---	---	---	---	4.7	0.84	87.9	0.08
Blood in Cough	---	---	---	---	0.89	0.21	6.07	0.88	2.31	0.57	15.6	0.26
Bleeding Other	---	---	---	---	1.27	0.2	24.5	0.83	---	---	---	---
Bleeding at injection site	---	---	---	---	3.68	0.72	67.4	0.14	---	---	---	---
Blood in Vomit	---	---	---	---	---	---	---	---	---	---	---	---
Bleeding from Vagina	---	---	---	---	1.84	0.32	34.7	0.55	---	---	---	---
Bleeding in urine	---	---	---	---	---	---	---	---	2.9	0.46	56	0.28
Bleeding Skin	---	---	---	---	---	---	---	---	---	---	---	---

--- = n<5 and OR not calculated

Estimation of *R* and Forward Projections

In this section, we detail the methods used to estimate the time varying instantaneous reproduction number (R_t), to estimate the basic reproduction number (R_0) and to make forward projections of incidence by country.

Basic underlying model and inference

We assumed the daily incidence could be approximated by a Poisson process using the renewal equation:

$$I(t) \sim \text{Pois}\left(R_t \sum_{s=1}^{T} \omega_s I(t-s) \right)$$

with $I(t), (t = 0,...,T)$ being the incidence of onset at time *t*, ω describing the serial interval distribution (assumed to be Gamma with mean 15.3 days and coefficient of variation 0.66 as estimated from the data), and R_t is the instantaneous reproduction number at time *t*.

It is then possible to calculate the likelihood of observing k cases with onset of symptoms on day *t*, conditional on the incidence up to day *t-1*, as:

$$P\left(I(t) = k \mid R_t, \{I_x\}_{x=0,\ldots,t-1}, \omega\right) = \frac{\lambda_t^{\,k}}{k!} e^{-\lambda_t}$$

with $\lambda_t = 1 \Big/ \left(R_t \sum_{s=1}^{T} \omega_s I(t-s) \right)$. Therefore the likelihood, L , of the observed time-series (from time 1 to T), conditional on the incidence observed on day 0, is:

$$L = \prod_{t=1..T} \left(P\left(I(t) = k \mid R_t, \{I_x\}_{x=0,\ldots,t-1}, \omega\right) \right).$$

Given this likelihood, a posterior distribution for R_t may be obtained either analytically[5] (using a Gamma distributed prior for R_t) or using Markov Chain Monte Carlo (MCMC) sampling.

Estimation of time varying instantaneous reproduction number (R_t)

For each country, we estimated the instantaneous reproduction over time R_t over sliding 4-week windows[5], chosen to maintain sample size and therefore precision in the estimate without hiding potential temporal trends (Figure S7). Estimates are shown for the 4-week time periods in which estimates could be obtained for confirmed and probable cases.

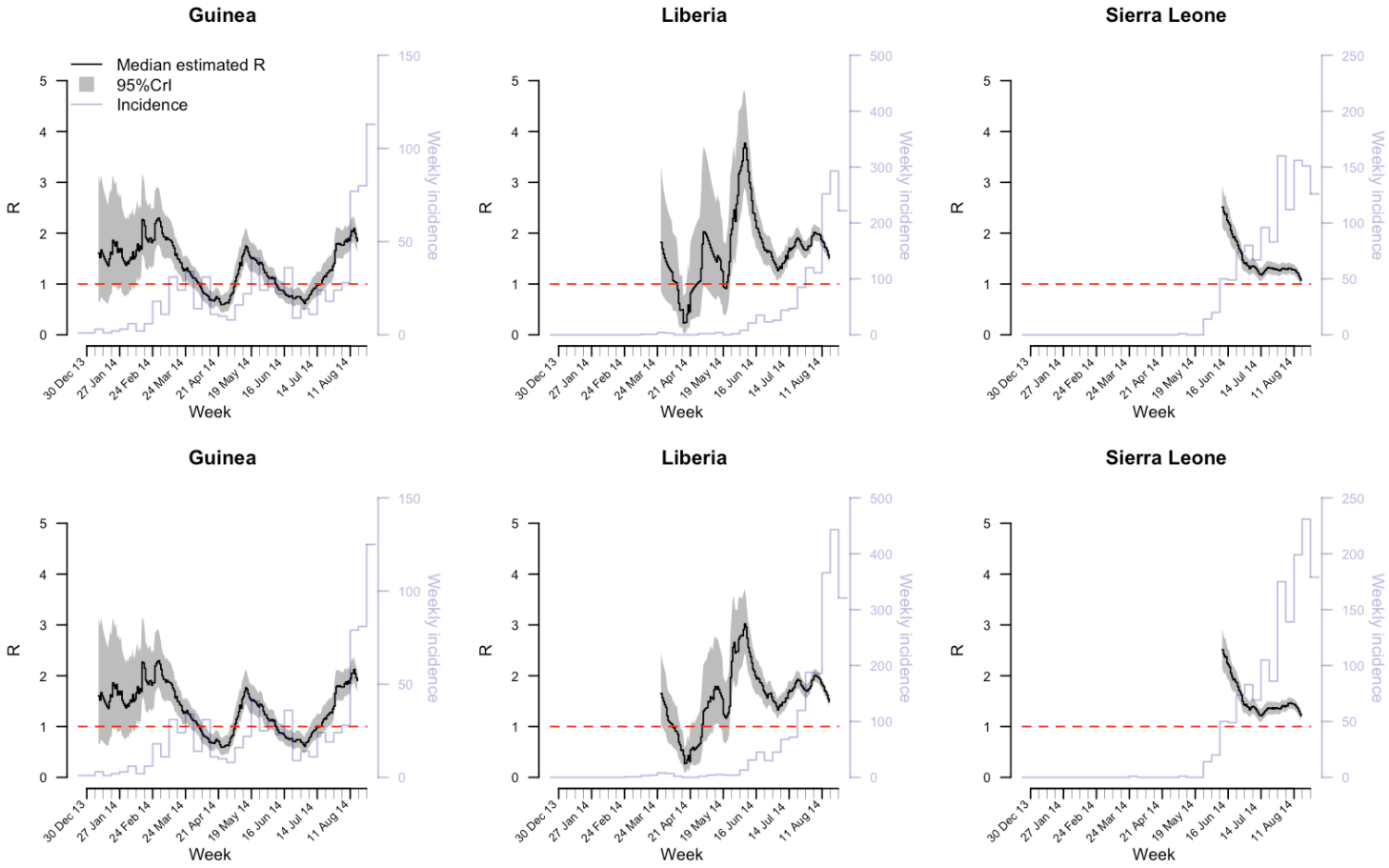

Figure S7: Estimates of the instantaneous reproduction number (R_t) over sliding 4-week windows, by country and by week of symptom onset based on the detailed case dataset. Estimates are shown at the windows mid-points. The top row is based on confirmed and probable cases, the bottom row is based on confirmed, probable and suspected cases. The serial interval is assumed to have a mean of 15.3 days. In each country, R_t is estimated from the day following the onset of symptoms of the first confirmed/probable case in that country. For Sierra Leone, estimates start the day following the onset of symptoms of the second confirmed/probable case. Indeed, the first and second cases have symptoms onset 23 days apart from each other, and are thus not likely to be epidemiologically linked.

Examination of these trends allowed us to evaluate the initial periods over which R_t appeared approximately constant, from which the basic reproduction number (R_0) was estimated. It also allowed us to define a time period later in the epidemic which was used to estimate a value of R_t to be used for projecting future incidence.

Estimation of the basic reproduction (R_0)

Estimating R_0 is equivalent to estimating a constant instantaneous reproduction number over the initial period where the epidemic is growing exponentially. This period $[0, T_{\exp}]$ was informed by both the analysis above and visual inspection of plots of the log transformed incidence over time. We then assumed that over this period, $R_0 = R_t$ and thus obtained the posterior distribution for the basic reproduction number.

$T_{\exp}$ was thereby set to 30 March 2014 for Guinea, to 24 August 2014 for Liberia and Nigeria, and to 6 July for Sierra-Leone, to obtain country-specific estimates of R_0 .

Additionally, given our estimates of the mean serial interval are somewhat larger than previously published values[6,7], we repeated this analysis for mean serial intervals of 11 and 13 days. Finally, all analyses were repeated considering either incidence of confirmed and probable cases or confirmed, probable and suspected cases. Estimates are shown in Table S6.

Table S6: Basic reproduction number (R_0) by country, based on the date of symptom onset of confirmed and probable cases or of confirmed, probable and suspected cases, from the line list database. Estimates are shown for 3 values of the mean serial interval (in days).

			Guinea	Liberia	Nigeria	Sierra-Leone
			Median R_0 (95% CrI)			
Confirmed and probable	Mean Serial interval	15.3	1.71 (1.44 ; 2.01)	1.83 (1.72 ; 1.94)	1.20 (0.67 ; `.96)	2.02 (1.79 ; 2.26)
		13	1.6 (1.32 ; 1.87)	1.68 (1.6 ; 1.77)	1.11 (0.67 ; 1.8)	1.84 (1.65 ; 2.06)
		11	1.5 (1.25 ; 1.74)	1.58 (1.5 ; 1.65)	1.07 (0.64 ; 1.66)	1.68 (1.5 ; 1.89)
Confirmed, probable, suspected	Mean Serial interval	15.3	1.71 (1.46 ; 2.00)	1.8 (1.72 ; 1.89)	1.18 (0.66 ; 1.86)	2.04 (1.81 ; 2.29)
		13	1.61 (1.35 ; 1.89)	1.69 (1.6 ; 1.77)	1.12 (0.63 ; 1.76)	1.84 (1.64 ; 2.05)
		11	1.49 (1.27 ; 1.74)	1.57 (1.49 ; 1.65)	1.07 (0.64 ; 1.68)	1.68 (1.49 ; 1.9)

Estimation of the recent instantaneous reproduction number (*R*) for projection

We then estimated country-specific instantaneous reproduction numbers, *R*, for the most recent 6-week period for use in generating forward projections. The end date was chosen as the latest date for which available data were likely to be complete (accounting for delays in reporting and inclusion in the database). The start date was chosen as the earliest date for which the 4-weekly instantaneous reproduction number estimated above could be assumed constant, following the period of initial exponential growth. The method was applied to both the daily case count data (on reporting dates) and the line list database (on onset dates). When using the reporting dates, we estimated *R* between 28 July 2014 and 7 September 2014. Given the delay between onset and report, when using the onset dates, we estimated *R* between 21 July 2014 and 31 August 2014. In the main text, we report results based on the daily case count data (on reporting dates) as they reflect the most current account of the situation, and are more comparable to other publicly available data.

Given uncertainty surrounding the epidemiological situation before the period when the instantaneous reproduction number was estimated, we jointly estimated *R* for that period as well as back-calculated the incidence before that period, using the known relationship between serial interval, growth rate and reproduction number[8]. The joint posterior distribution of *R* and the early epidemic curve (from which forward projections were generated) was inferred using MCMC sampling.

Again, sensitivity analyses were performed by estimating *R* assuming different mean serial intervals, and including suspected as well as confirmed and probable cases in the analysis. Estimates are presented in Table S7.

Table S7: Estimates of the instantaneous reproduction number (R) for the most recent 6 weeks by countries. Estimates are based on the daily case count data (on reporting dates from 28 July 2014 to 7 September 2014) and on the line list database (on date of symptom onset from 21 July 2014 and 1 September 2014) of confirmed and probable cases or of confirmed, probable and suspected cases. Estimates are shown for three values of the mean serial interval in days.

				Guinea	Liberia	Sierra Leone
				Median R (95% CrI)		
Daily case count	Confirmed and probable	Mean serial interval	15.3	1.81 (1.6 ; 2.03)	1.51 (1.41 ; 1.60)	1.38 (1.27 ; 1.51)
			13	1.67 (1.49 ; 1.85)	1.43 (1.34 ; 1.52)	1.32 (1.21 ; 1.42)
			11	1.54 (1.38 ; 1.72)	1.34 (1.26 ; 1.42)	1.27 (1.16 ; 1.38)
	Confirmed, probable, suspected	Mean serial interval	15.3	1.92 (1.73 ; 2.16)	1.57 (1.48 ; 1.66)	1.35 (1.24 ; 1.46)
			13	1.78 (1.57 ; 1.96)	1.48 (1.41 ; 1.56)	1.3 (1.2 ; 1.4)
			11	1.62 (1.45 ; 1.78)	1.39 (1.32 ; 1.46)	1.25 (1.15 ; 1.35)
Line list database	Confirmed and probable	Mean serial interval	15.3	1.87 (1.65 ; 2.1)	1.49 (1.38 ; 1.61)	1.08 (0.99 ; 1.18)
			13	1.72 (1.52 ; 1.93)	1.41 (1.32 ; 1.51)	1.07 (0.98 ; 1.17)
			11	1.59 (1.42 ; 1.77)	1.33 (1.24 ; 1.42)	1.06 (0.97 ; 1.15)
	Confirmed, probable, suspected	Mean serial interval	15.3	1.93 (1.73 ; 2.14)	1.47 (1.39 ; 1.57)	1.24 (1.14 ; 1.33)
			13	1.76 (1.57 ; 2)	1.4 (1.32 ; 1.48)	1.2 (1.11 ; 1.28)
			11	1.63 (1.45 ; 1.8)	1.32 (1.24 ; 1.39)	1.16 (1.08 ; 1.25)

Forward projections

We used two methods to project country-specific national case numbers by week of symptom onset up to 16 November 2014.

Method A (regression): The number of incident cases per week (over the time periods defined in the previous paragraph) were log transformed (with an addition of 0.5 to avoid taking the logarithm of zero) and regressed against week number (from 1 to 6 where week 1 = 21-27 July for onset dates, and 28 July-3 August for report dates, and week 6 = 25-31 August for onset dates and 1-7 September for report dates). Projections were obtained from the fitted values. The bounds presented in Figures S8 and S10 are 95% prediction intervals (PIs) and 95% confidence intervals (CIs).

For method A, we only considered confirmed and probable cases, from both the line list and the daily case count databases.

Method B (renewal equation): We simulated future incidence in each country using a stochastic branching process model based on the renewal equation[9], assuming a Poisson offspring distribution:

$$I(t) \sim \text{Pois}\left(R\sum_{s=1}^{T} \omega_s I(t-s) \right)$$

with $I(t)$ being the incidence of onset at time t, ω describing the serial interval distribution (assumed to be Gamma with mean 15.3 days and coefficient of variation 0.66 as estimated from the data), and *R* is the instantaneous reproduction number. For each simulation, the initial conditions and *R* were jointly sampled from their joint posterior distributions (see previous paragraph). Confidence intervals were generated from 1,000 simulations.

For method B, projections were obtained for confirmed and probable cases, and for confirmed, probable and suspected cases, from both the line list and the daily case count databases (Figures S9, S11-S13).

While method B gives narrower confidence intervals, the central estimates generated by each method are close to identical.

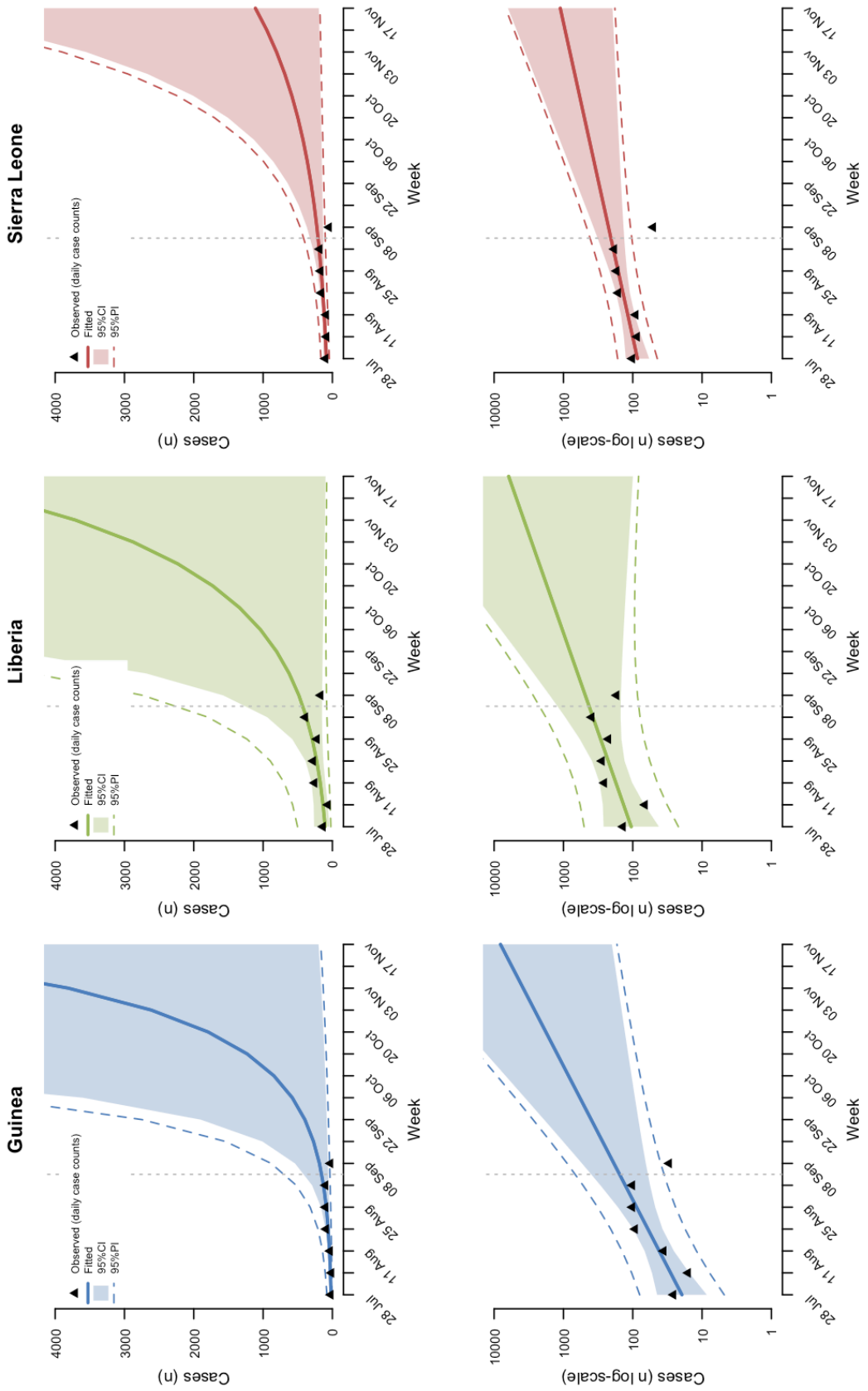

Figure S8: National Projections using Confirmed and Probable Cases from the daily case count database (by date of report) using Method A. The vertical dotted lines indicate the date up to which data were used for R estimation.

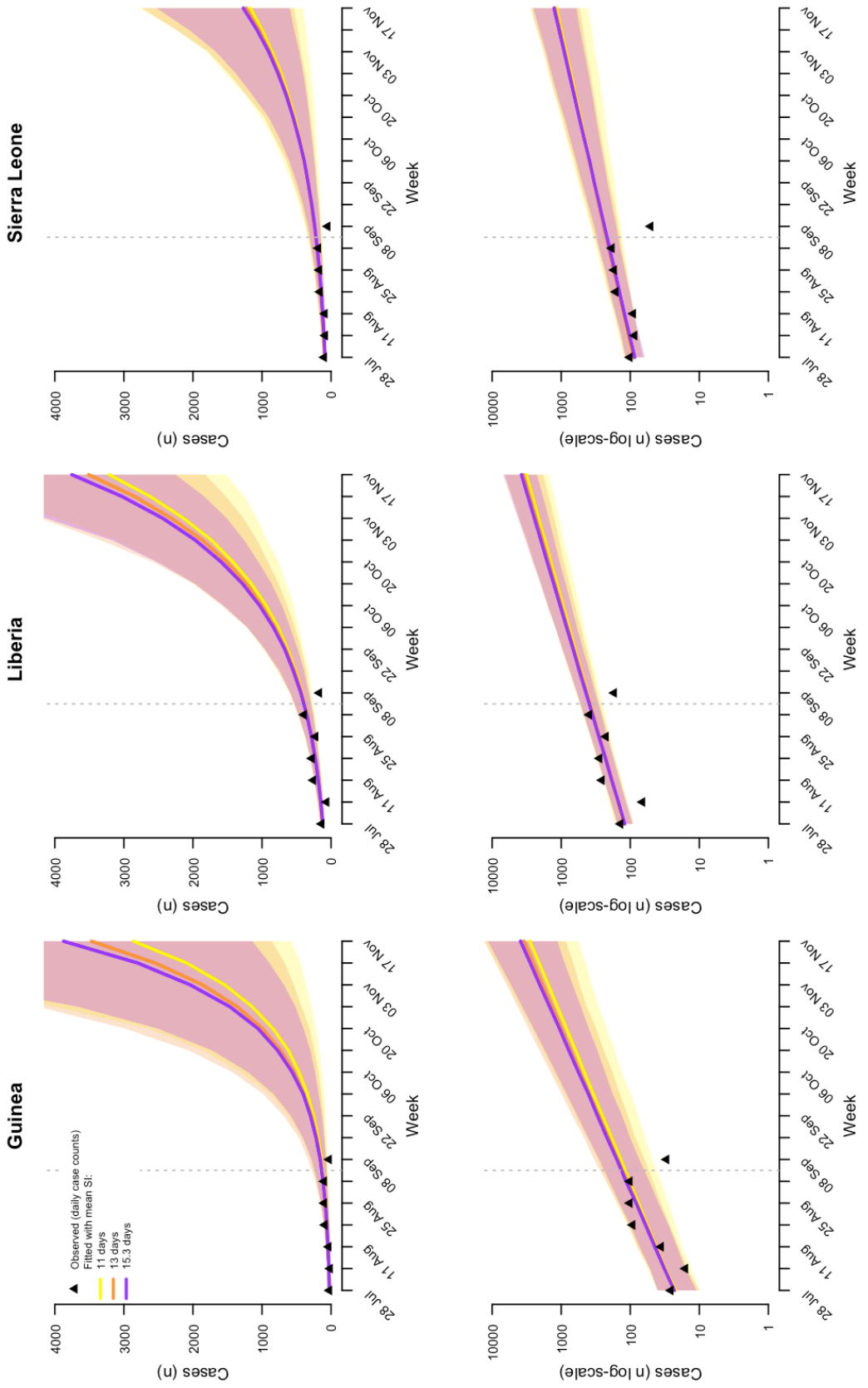

Figure S9: National Projections using Confirmed and Probable Cases from the daily case count database (by date of report) using Method B. The vertical dotted lines indicate the date up to which data were used for R estimation.

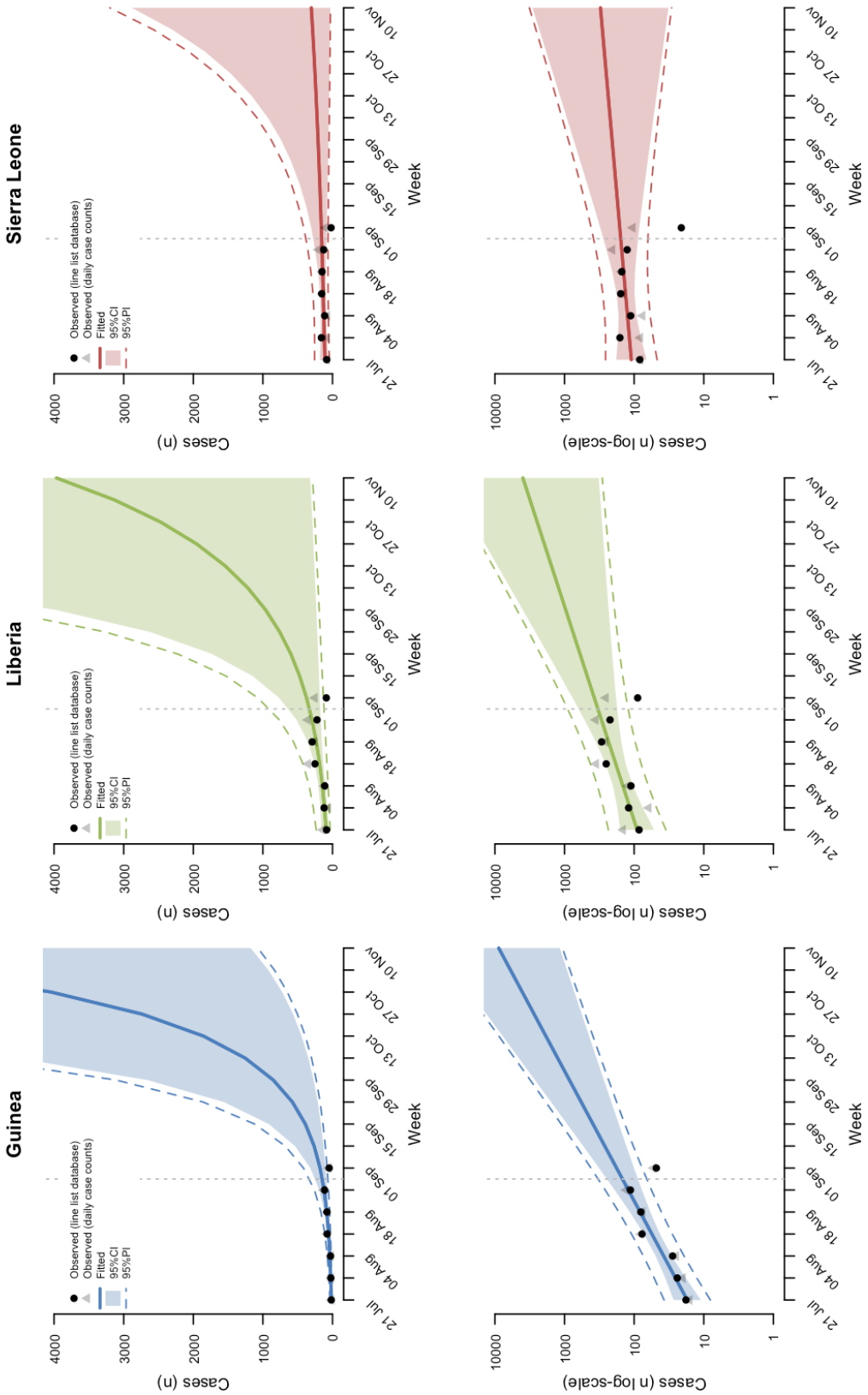

Figure S10: National Projections using Confirmed and Probable Cases from the line list database (by date of onset) using Method A. Weekly incidence of onset from the daily case count database is also presented (grey triangles) for comparison. The vertical dotted lines indicate the date up to which data were used for R estimation.

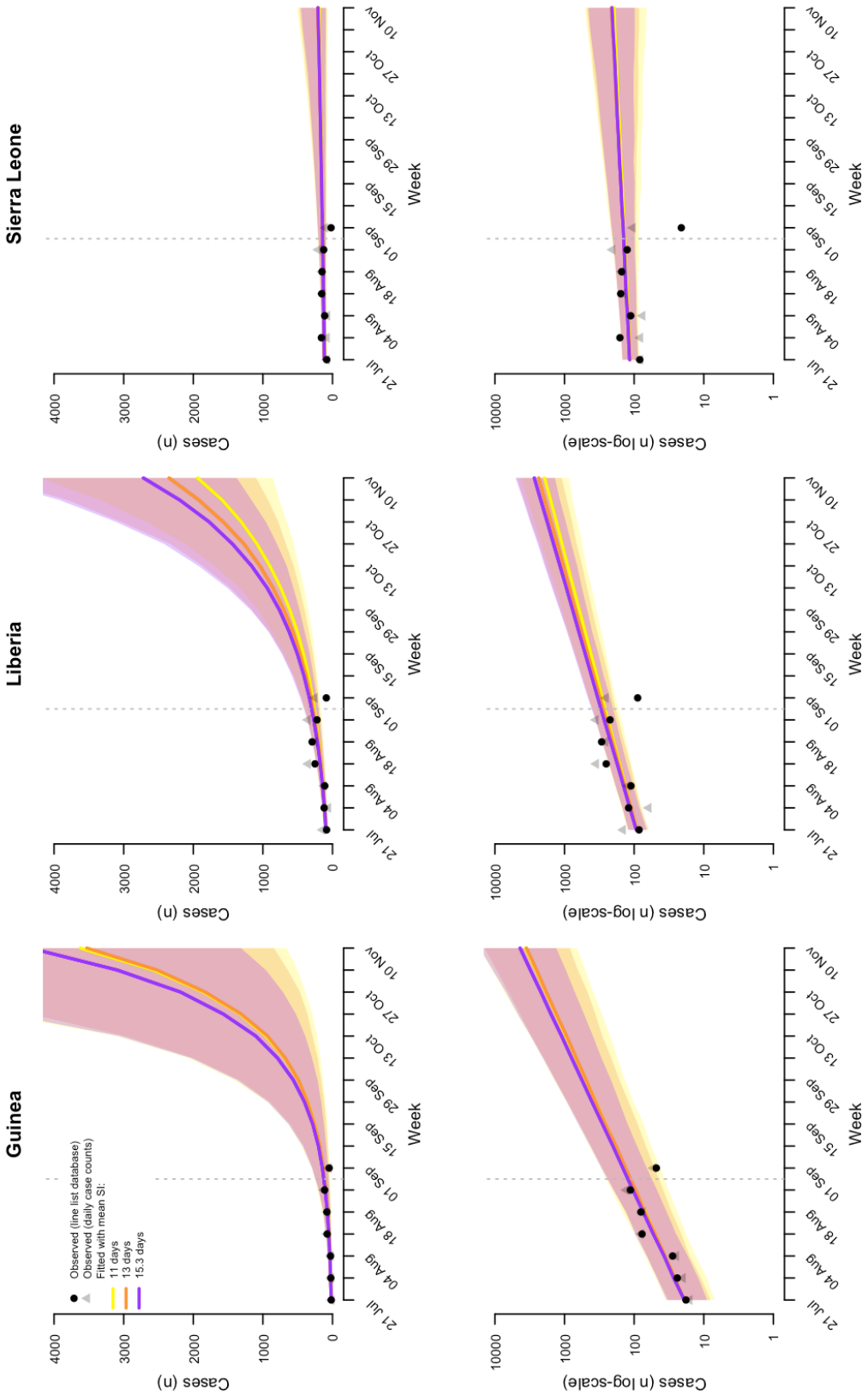

Figure S11. National Projections using Confirmed and Probable Cases from the line list database (by date of onset) using Method B. Weekly incidence of onset from the daily case count database is also presented (grey triangles) for comparison. The vertical dotted lines indicate the date up to which data were used for R estimation.

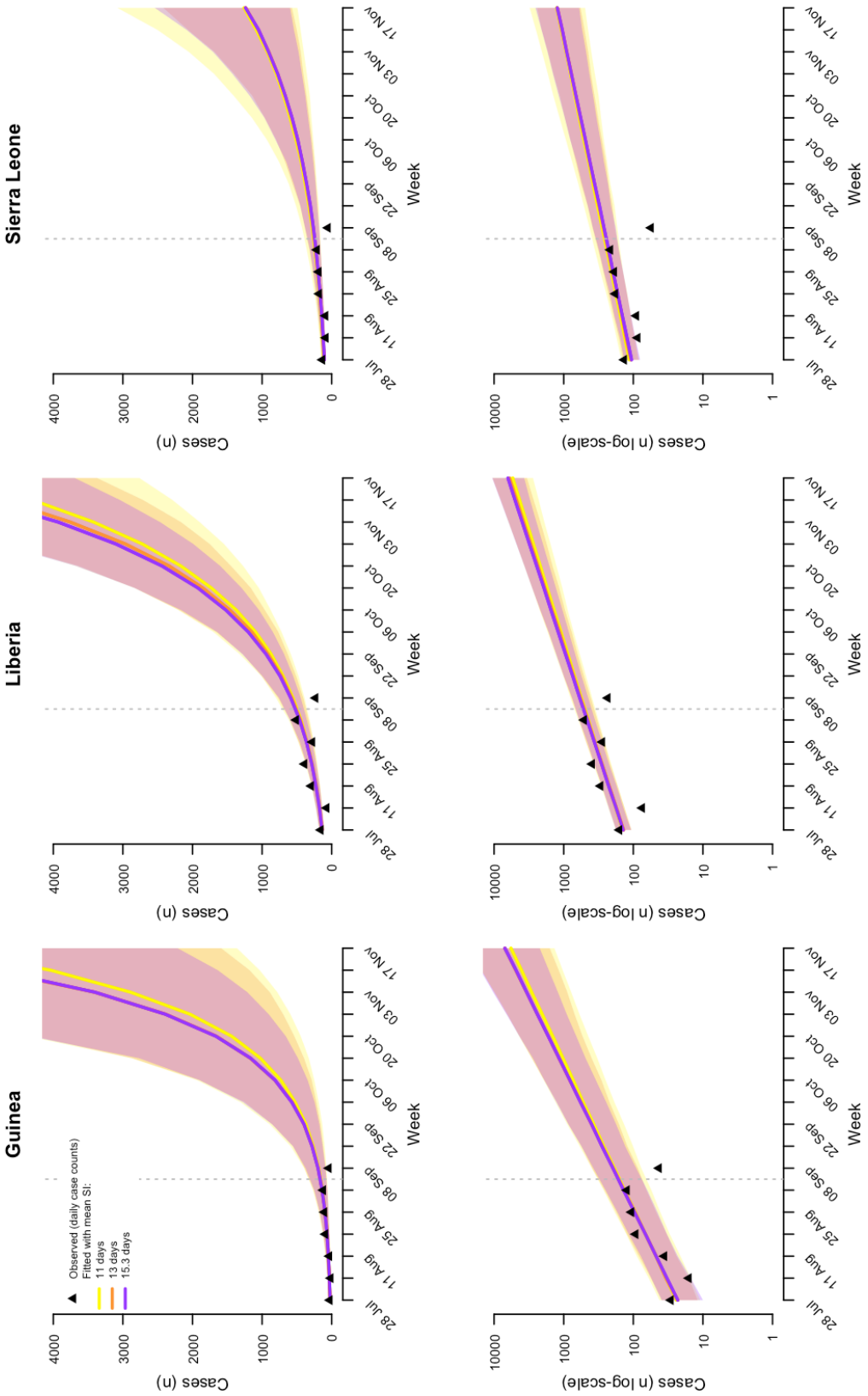

Figure S12. National Projections using Confirmed, Probable and Suspected Cases from the daily case count database (by date of report) using Method B. The vertical dotted lines indicate the date up to which data were used for R estimation.

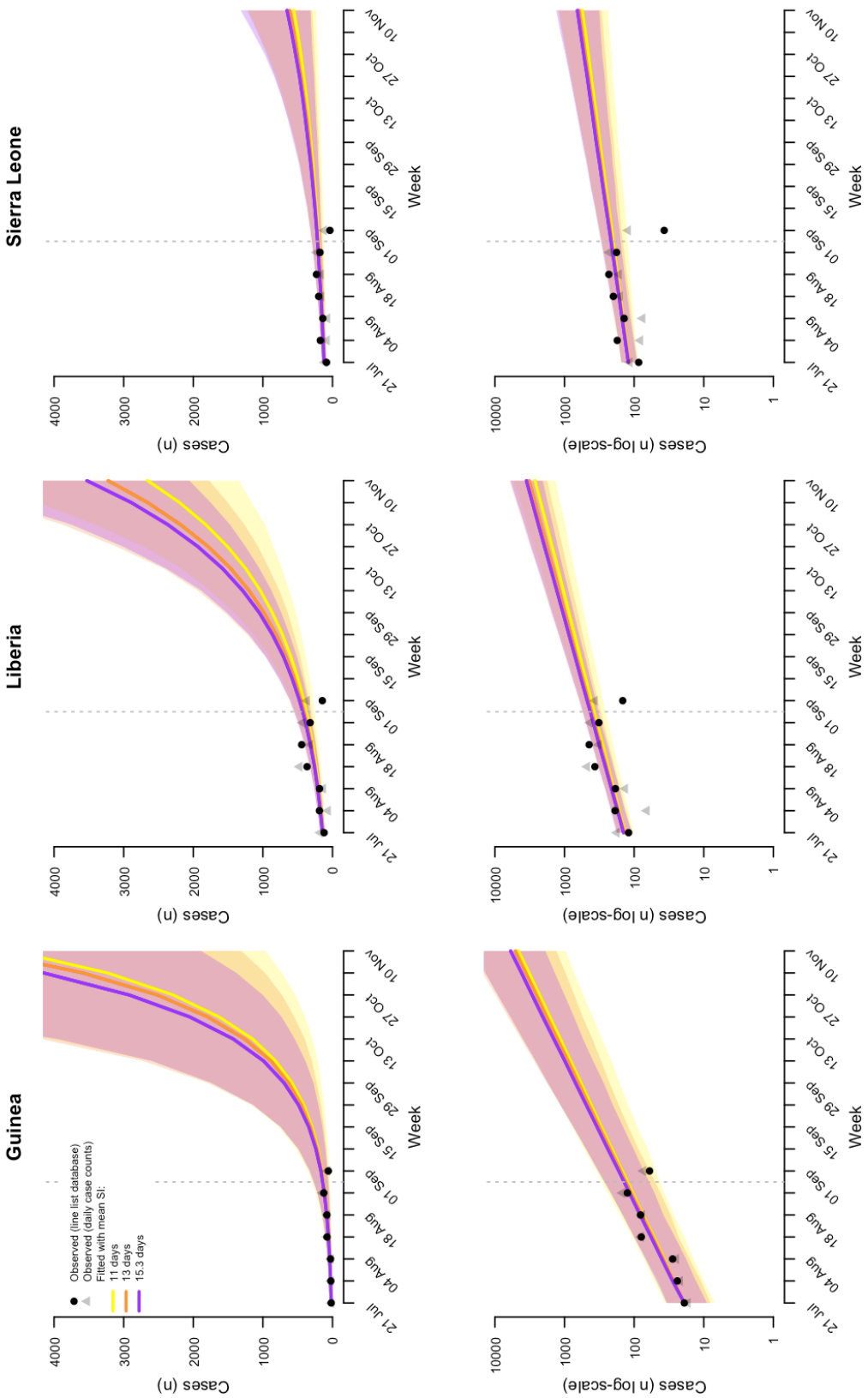

Figure S13. National Projections using Confirmed, Probable and Suspected Cases from the line list database (by date of onset) using Method B. Weekly incidence of onset from the daily case count database is also presented (grey triangles) for comparison. The vertical dotted lines indicate the date up to which data were used for R estimation.

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VIRAL HEMORRHAGIC FEVER CASE INVESTIGATION FORM

Outbreak Case ID: _____

Health Facility Case ID: _____

Date of Case Report: ____/____/_____ (D, M, Yr)

Section 1. Patient Information

Patient's Surname: _____ Other Names:_____ Age: _____ ☐ Years ☐ Months

Gender: ☐ Male ☐ Female Phone Number of Patient/Family Member:_____ Owner of Phone: _____

Status of Patient at Time of This Case Report: ☐ Alive ☐ Dead *If dead,* Date of Death: ___/___/____ (D, M, Yr)

Permanent Residence:

Head of Household: _____ Village/Town: _____ Parish: _____

Country of Residence: _____ District: _____ Sub-County: _____

Occupation:

☐ Farmer ☐ Butcher ☐ Hunter/trader of game meat ☐ Miner ☐ Religious leader ☐ Housewife ☐ Pupil/student ☐ Child

☐ Businessman/woman; type of business: _____ ☐ Transporter; type of transport: _____

☐ Healthcare worker; position: _____ healthcare facility: _____ ☐ Traditional/spiritual healer

☐ Other; please specify occupation: _____

Location Where Patient Became Ill:

Village/Town: _____ District: _____ Sub-County: _____

GPS Coordinates at House: latitude: _____ longitude: _____

If different from permanent residence, Dates residing at this location: ___/___/____ - ___/___/____ (D, M, Yr)

Section 2. Clinical Signs and Symptoms

Date of Initial Symptom Onset: ____/____/_____ **(D, M, Yr)**

Please tick an answer for <u>ALL</u> symptoms indicating if they occurred during <u>this illness</u> between symptom onset and case detection:

Fever	☐ Yes ☐ No ☐ Unk
If yes, Temp: ____° C Source: ☐ Axillary ☐ Oral ☐ Rectal	
Vomiting/nausea	☐ Yes ☐ No ☐ Unk
Diarrhea	☐ Yes ☐ No ☐ Unk
Intense fatigue/general weakness	☐ Yes ☐ No ☐ Unk
Anorexia/loss of appetite	☐ Yes ☐ No ☐ Unk
Abdominal pain	☐ Yes ☐ No ☐ Unk
Chest pain	☐ Yes ☐ No ☐ Unk
Muscle pain	☐ Yes ☐ No ☐ Unk
Joint pain	☐ Yes ☐ No ☐ Unk
Headache	☐ Yes ☐ No ☐ Unk
Cough	☐ Yes ☐ No ☐ Unk
Difficulty breathing	☐ Yes ☐ No ☐ Unk
Difficulty swallowing	☐ Yes ☐ No ☐ Unk
Sore throat	☐ Yes ☐ No ☐ Unk
Jaundice (yellow eyes/gums/skin)	☐ Yes ☐ No ☐ Unk
Conjunctivitis (red eyes)	☐ Yes ☐ No ☐ Unk
Skin rash	☐ Yes ☐ No ☐ Unk
Hiccups	☐ Yes ☐ No ☐ Unk
Pain behind eyes/sensitive to light	☐ Yes ☐ No ☐ Unk
Coma/unconscious	☐ Yes ☐ No ☐ Unk
Confused or disoriented	☐ Yes ☐ No ☐ Unk

Unexplained bleeding from any site	☐ Yes ☐ No ☐ Unk
If Yes:	
Bleeding of the gums	☐ Yes ☐ No ☐ Unk
Bleeding from injection site	☐ Yes ☐ No ☐ Unk
Nose bleed (epistaxis)	☐ Yes ☐ No ☐ Unk
Bloody or black stools (melena)	☐ Yes ☐ No ☐ Unk
Fresh/red blood in vomit (hematemesis)	☐ Yes ☐ No ☐ Unk
Digested blood/"coffee grounds" in vomit	☐ Yes ☐ No ☐ Unk
Coughing up blood (hemoptysis)	☐ Yes ☐ No ☐ Unk
Bleeding from vagina, other than menstruation	☐ Yes ☐ No ☐ Unk
Bruising of the skin (petechiae/ecchymosis)	☐ Yes ☐ No ☐ Unk
Blood in urine (hematuria)	☐ Yes ☐ No ☐ Unk
Other hemorrhagic symptoms	☐ Yes ☐ No ☐ Unk
If yes, please specify: _____	

Other non-hemorrhagic clinical symptoms: ☐ Yes ☐ No ☐ Unk

If yes, please specifiy: _____

Section 3. Hospitalization Information

At the time of this case report, is the patient hospitalized or currently being admitted to the hospital? ☐ Yes ☐ No

If yes, Date of Hospital Admission: ____/____/_____ (D, M, Yr) Health Facility Name: _____

Village/Town: _____ District: _____ Sub-County: _____

Is the patient in isolation or currently being placed there? ☐ Yes ☐ No *If yes,* date of isolation: ____/____/_____ (D, M, Yr)

Was the patient hospitalized or did he/she visit a health clinic previously <u>for this illness</u>? ☐ Yes ☐ No ☐ Unk

If yes, please complete a line of information for each previous hospitalization:

Dates of Hospitalization	Health Facility Name	Village	District	Was the patient isolated?
___/___/____ - ___/___/____ (D, M, Yr)				☐ Yes ☐ No
___/___/____ - ___/___/____ (D, M, Yr)				☐ Yes ☐ No

Outbreak Case ID: _____

Section 4. Epidemiological Risk Factors and Exposures

IN THE PAST ONE(1) MONTH PRIOR TO SYMPTOM ONSET:

1. Did the patient have contact with a known or suspect case, or with any sick person before becoming ill? ☐ Yes ☐ No ☐ Unk

If yes, please complete one line of information for each sick source case:

Name of Source Case	Relation to Patient	Dates of Exposure (D, M, Yr)	Village	District	Was the person dead or alive ?	Contact Types**
		__/__/__ - __/__/__			☐ Alive ☐ Dead, date of death: __/__/____ (D, M, Y)	
		__/__/__ - __/__/__			☐ Alive ☐ Dead, date of death: __/__/____ (D, M, Y)	
		__/__/__ - __/__/__			☐ Alive ☐ Dead, date of death: __/__/____ (D, M, Y)	

****Contact Types: (list all that apply)**

1 – Touched the body fluids of the case (blood, vomit, saliva, urine, feces)
2 – Had direct physical contact with the body of the case (alive or dead)
3 – Touched or shared the linens, clothes, or dishes/eating utensils of the case
4 – Slept, ate, or spent time in the same household or room as the case

2. Did the patient attend a funeral before becoming ill? ☐ Yes ☐ No ☐ Unk

If yes, please complete one line of information for each funeral attended:

Name of Deceased Person	Relation to Patient	Dates of Funeral Attendance (D, M, Yr)	Village	District	Did the patient participate (carry or touch the body)?
		__/__/____ - __/__/____			☐ Yes ☐ No
		__/__/____ - __/__/____			☐ Yes ☐ No

3. Did the patient travel outside their home or village/town before becoming ill? ☐ Yes ☐ No ☐ Unk

If yes, Village: _____ District: _____ Date(s): __/__/____ - __/__/____ (D, M, Yr)

4. Was the patient hospitalized or did he/she go to a clinic or visit anyone in the hospital before this illness? ☐ Yes ☐ No ☐ Unk

If yes, Patient Visited: _____ Date(s): __/__/____ - __/__/____ (D, M, Yr)

Health Facility Name: _____ Village: _____ District: _____

5. Did the patient consult a traditional/spiritual healer before becoming ill? ☐ Yes ☐ No ☐ Unk

If yes, Name of Healer: _____Village: _____ District: _____ Date: __/__/____ (D, M, Yr)

6. Did the patient have direct contact (hunt, touch, eat) with animals or uncooked meat before becoming ill? ☐ Yes ☐ No ☐ Unk

If yes, please tick all that apply:

Animal:	Status (check one only):
☐ Bats or bat feces/urine	☐ Healthy ☐ Sick/Dead
☐ Primates (monkeys)	☐ Healthy ☐ Sick/Dead
☐ Rodents or rodent feces/urine	☐ Healthy ☐ Sick/Dead
☐ Pigs	☐ Healthy ☐ Sick/Dead
☐ Chickens or wild birds	☐ Healthy ☐ Sick/Dead
☐ Cows, goats, or sheep	☐ Healthy ☐ Sick/Dead
☐ Other; *specify*_____	☐ Healthy ☐ Sick/Dead

7. Did the patient get bitten by a tick in the past 2 weeks? ☐ Yes ☐ No ☐ Unk

Section 5. Clinical Specimens and Laboratory Testing

Specimen/shipping instructions:

- Label sample with **patient name, date of collection,** and **case ID**
- Send sample **cold** with a **cold/ice pack,** and **packaged appropriately**.
- Collect whole blood in a purple top (EDTA) tube – green or red top tubes acceptable if purple not available
- **Preferred sample volume = 4ml** (minimum sample volume = 2ml)

Has this patient had a sample submitted previously? ☐ Yes ☐ No

Sample 1: *Do not complete UVRI Only*

Sample Collection Date: ____/____/_____ (D, M, Yr)

Sample Type:

☐ Whole Blood
☐ Post-mortem heart blood
☐ Skin biopsy
☐ Other specimen type, specify: _____

Sample 2: *Do not complete UVRI Only*

Sample Collection Date: ____/____/_____ (D, M, Yr)

Sample Type:

☐ Whole Blood
☐ Post-mortem heart blood
☐ Skin biopsy
☐ Other specimen type, specify: _____

Section 6. Case Report Form Completed by:

Name: _____ Phone: _____ E-mail: _____

Position: _____ District: _____ Health Facility: _____

Information provided by: ☐ Patient ☐ Proxy; *If proxy*, Name:_____ Relation to Patient: _____

Case Name: _____ **Outbreak Case ID:** _____

If the patient is deceased or has already recovered from illness, please fill out the next section.
If the patient is currently admitted to the hospital, leave the next section blank (it will be completed upon discharge)

Section 7. Patient Outcome Information

Please fill out this section at the time of patient recovery and discharge from the hospital OR at the time of patient death.

Date Outcome Information Completed: ____/____/_____ (D, M, Yr)

Final Status of the Patient: ☐ Alive ☐ Dead

Did the patient have signs of unexplained bleeding at any time during their illness? ☐ Yes ☐ No ☐ Unk
If yes, please specify: _____

If the patient has recovered and been discharged from the hospital:

Name of hospital discharged from: _____ District: _____
If the patient was isolated, Date of discharge from the isolation ward: ____/____/_____ (D, M, Yr)
Date of discharge from the hospital: ____/____/_____ (D, M, Yr)

If the patient is dead:

Date of Death: ____/____/_____ (D, M, Yr)
Place of Death: ☐ Community ☐ Hospital: _____ ☐ Other: _____
Village: _____ District: _____ Sub-County: _____

Date of Funeral/Burial: ____/____/_____ (D, M, Yr) Funeral conducted by: ☐ Family/community ☐ Outbreak burial team
Place of Funeral/Burial:
Village: _____ District: _____ Sub-County: _____

Please tick an answer for ALL symptoms indicating if they occurred at any time during this illness including during hospitalization:

Fever	☐ Yes ☐ No ☐ Unk
If yes, Temp: ____° C Source: ☐ Axillary ☐ Oral ☐ Rectal	
Vomiting/nausea	☐ Yes ☐ No ☐ Unk
Diarrhea	☐ Yes ☐ No ☐ Unk
Intense fatigue/general weakness	☐ Yes ☐ No ☐ Unk
Anorexia/loss of appetite	☐ Yes ☐ No ☐ Unk
Abdominal pain	☐ Yes ☐ No ☐ Unk
Chest pain	☐ Yes ☐ No ☐ Unk
Muscle pain	☐ Yes ☐ No ☐ Unk
Joint pain	☐ Yes ☐ No ☐ Unk
Headache	☐ Yes ☐ No ☐ Unk
Cough	☐ Yes ☐ No ☐ Unk
Difficulty breathing	☐ Yes ☐ No ☐ Unk
Difficulty swallowing	☐ Yes ☐ No ☐ Unk
Sore throat	☐ Yes ☐ No ☐ Unk
Jaundice (yellow eyes/gums/skin)	☐ Yes ☐ No ☐ Unk
Conjunctivitis (red eyes)	☐ Yes ☐ No ☐ Unk
Skin rash	☐ Yes ☐ No ☐ Unk
Hiccups	☐ Yes ☐ No ☐ Unk
Pain behind eyes/sensitive to light	☐ Yes ☐ No ☐ Unk
Coma/unconscious	☐ Yes ☐ No ☐ Unk
Confused or disoriented	☐ Yes ☐ No ☐ Unk

Other non-hemorrhagic clinical symptoms: ☐ Yes ☐ No ☐ Unk
If yes, please specifiy: _____

Case Name: _____ MoH/UVRI Case ID: _____

If the patient is deceased or has already recovered from illness, please fill out the next section.
If the patient is currently admitted to the hospital, leave the next section blank (it will be completed upon discharge)

Section 7. Patient Outcome Information

Please fill out this section at the time of patient recovery and discharge from the hospital OR at the time of patient death.

Date Outcome Information Completed: ____/____/_____ (D, M, Yr)

Final Status of the Patient: ☐ Alive ☐ Dead

Did the patient have signs of unexplained bleeding at any time during their illness? ☐ Yes ☐ No ☐ Unk
If yes, please specify: _____

If the patient has recovered and been discharged from the hospital:

Name of hospital discharged from: _____ District: _____
If the patient was isolated, Date of discharge from the isolation ward: ____/____/_____ (D, M, Yr)
Date of discharge from the hospital: ____/____/_____ (D, M, Yr)

If the patient is dead:

Date of Death: ____/____/_____ (D, M, Yr)
Place of Death: ☐ Community ☐ Hospital: _____ ☐ Other: _____
Village: _____ District: _____ Sub-County: _____

Date of Funeral/Burial: ____/____/_____ (D, M, Yr) Funeral conducted by: ☐ Family/community ☐ Outbreak burial team
Place of Funeral/Burial:
Village: _____ District: _____ Sub-County: _____

Please tick an answer for ALL symptoms indicating if they occurred at any time during this illness including during hospitalization:

Fever	☐ Yes ☐ No ☐ Unk
If yes, Temp: ____° C Source: ☐ Axillary ☐ Oral ☐ Rectal	
Vomiting/nausea	☐ Yes ☐ No ☐ Unk
Diarrhea	☐ Yes ☐ No ☐ Unk
Intense fatigue/general weakness	☐ Yes ☐ No ☐ Unk
Anorexia/loss of appetite	☐ Yes ☐ No ☐ Unk
Abdominal pain	☐ Yes ☐ No ☐ Unk
Chest pain	☐ Yes ☐ No ☐ Unk
Muscle pain	☐ Yes ☐ No ☐ Unk
Joint pain	☐ Yes ☐ No ☐ Unk
Headache	☐ Yes ☐ No ☐ Unk
Cough	☐ Yes ☐ No ☐ Unk
Difficulty breathing	☐ Yes ☐ No ☐ Unk
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Jaundice (yellow eyes/gums/skin)	☐ Yes ☐ No ☐ Unk
Conjunctivitis (red eyes)	☐ Yes ☐ No ☐ Unk
Skin rash	☐ Yes ☐ No ☐ Unk
Hiccups	☐ Yes ☐ No ☐ Unk
Pain behind eyes/sensitive to light	☐ Yes ☐ No ☐ Unk
Coma/unconscious	☐ Yes ☐ No ☐ Unk
Confused or disoriented	☐ Yes ☐ No ☐ Unk

Other non-hemorrhagic clinical symptoms: ☐ Yes ☐ No ☐ Unk
If yes, please specifiy: _____