1 **Supplementary Information**

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13 **1.1 Summary of latent class analysis output**

Assay result	Assay +ve / Group N	Risk	Risk Ratio
GP ELISA High Titre			
Group A	11 / 20	0.550	17.4
Group B	3 / 95	0.032	(5.3 – 56.8)
WB GP positive			
Group A	10 / 20	0.500	23.7
Group B	2 / 95	0.021	(5.6 – 100.2)
WB NP positive			
Group A	17 / 20	0.850	5.8
Group B	14 / 95	0.147	(3.4 – 9.7)
WB VP40 positive			
Group A	4 / 20	0.042	14.2
Group B	12 / 95	0.600	(5.1 – 39.7)
WB negative			
Group A	0 / 20	0.789	-
Group B	75 / 95	0	

14 **Supplementary table 1:** Results of latent class analysis from GP-ELISA

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1.2 Consort diagram of sample processing pipeline and selection process


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┌─────────────────────────────────┐
│   499 serum samples collected   │
└─────────────────────────────────┘
         │              ┌──────────────────┐
         │─────────────▶│   Sample lost    │
         │              │      N = 1       │
         ▼              └──────────────────┘
┌─────────────────────────────────┐
│        EBOV-GP ELISA            │
│         498 samples             │
└─────────────────────────────────┘
┌─────────────────────────────────┐
│     Latent profile analysis     │
│          High = 14              │
│      Intermediate = 278         │        ┌──────────────────────────┐
│          Low = 206              │        │        Removed           │
└─────────────────────────────────┘        │        High = 0          │
         │──────────────────────────────▶ │  Intermediate = 177      │
         ▼                                  │        Low = 206         │
┌─────────────────────────────────┐        └──────────────────────────┘
│     Western Blot (N = 115)      │
│       EBOV glycoprotein         │
│       EBOV nucleoprotein        │
│          EBOV VP40              │
└─────────────────────────────────┘
┌─────────────────────────────────┐
│     Latent Class Analysis       │
│         Group A = 20            │
│         Group B = 95            │        ┌──────────────────────────┐
└─────────────────────────────────┘        │        Removed           │
         │──────────────────────────────▶ │       Group A = 0        │
         ▼                                  │       Group B = 53       │
┌─────────────────────────────────┐        └──────────────────────────┘
│  EBOV Neutralisation (N = 62)   │
│        Makona variant           │
└─────────────────────────────────┘
```
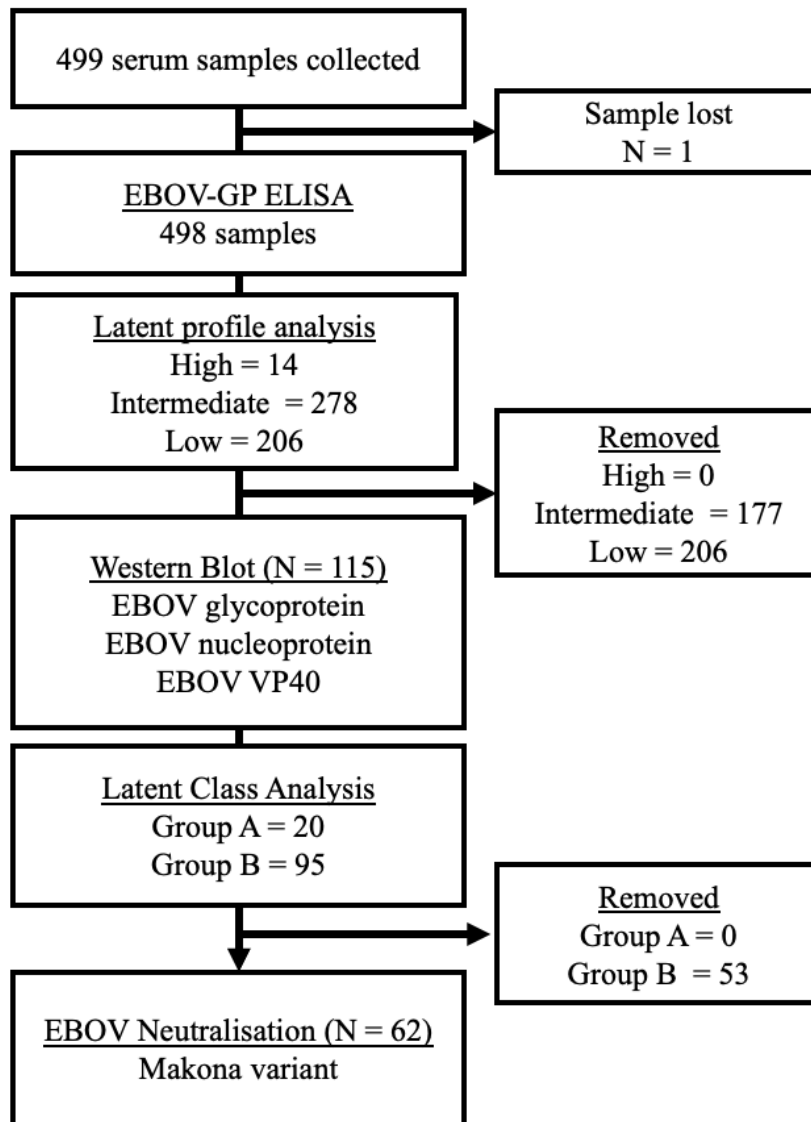
Supplementary figure 1: Consort diagram of serum sample processing.

1.3 Outcomes of serological analysis stratified by village status

	Affected (N=194)	**Unaffected** (N=304)	**Overall** (N=498)
Anti-GP ELISA			
High	9 (4.6%)	5 (1.6%)	14 (2.8%)
Intermediate	111 (57.2%)	167 (54.9%)	278 (55.8%)
Low	74 (38.1%)	132 (43.4%)	206 (41.4%)
Latent class group			
Group A	8 (16.3%)	12 (18.2%)	20 (17.4%)
Group B	41 (83.7%)	54 (81.8%)	95 (82.6%)
Not tested	145	238	383
Neutralisation data			
High	3 (10.3%)	2 (6.1%)	5 (1.0%)
Low	3 (10.3%)	2 (6.1%)	5 (1.0%)
Negative	23 (79.3%)	29 (6.1%)	52 (10.4%)
Not tested	165	271	436

Supplementary table 2: Serological outcome data stratified by village status. Villages were classified as affected or unaffected by 2013-2016 EBOV outbreak (see methods).

1.4 Ecological associations with EBOV immunological outcomes: Sensitivity analysis

Predictors	Odds ratio	95% CI	p-value
Outcome			
LCA group A	20 / 498		
Village status			
Affected	Reference		0.86
Unaffected	1.09	0.40 – 2.94	
Age			
	1.03	0.99 – 1.06	0.12
Closed forest			
Shape index (500m)	0.28	0.08 – 0.98	0.02
Vegetation			
Perimeter area ratio (20,000m)	0.35	0.08 – 0.98	0.01
Random Effects			
ICC	0.02		
N $_{village}$	38		

Supplementary table 3: Multivariable generalised linear mixed effects model (binomial family) of immunological group defined by latent class analysis of ELISA and Western Blot analysis (Group A vs Group B). Success defined as Group A. Variables were selected using a forward, stepwise approach using AIC. P-values estimated by likelihood ratio test. Mixed effect models not used due to singular fit from village-level random intercepts. Two-sided test.

Predictors	Estimate	95% CI	p-value
Age			
18 – 30	Reference		
31 – 50	0.19	-0.15 – 0.53	0.55
51 – 90	0.15	-0.25– 0.55	
Closed canopy cover			
Perimeter area ratio (500m)	-0.63	-1.24 – -0.02	0.05
Random Effects			
ICC	0.14		
N $_{village}$	24		

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77 **Supplementary table 4:** Multivariable mixed-effects linear regression of $\log_2$ anti-EBOV-GP

78 total antibody titre excluding all participants from villages with confirmed EBOV cases during

79 2013-2016 outbreak (195/498; 39.2%). Variables were selected using a forward, stepwise

80 approach using AIC. P-values estimated by likelihood ratio test. Two-sided test.

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Predictors	Odds ratio	95% CI	p-value
Outcome			
High titre GP-ELISA	14/498		
Village status			
Affected	Reference		0.24
Unaffected	0.35	0.14 – 1.56	
Age			
	1.02	0.98 – 1.06	0.35
Vegetation			
Perimeter area ratio (20,000m)	0.37	0.12 – 1.04	0.06

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96   **Supplementary table 5**: Multivariable generalised linear model (binomial family) of $\log_2$ anti-

97   EBOV-GP total antibody titre classified by finite mixture models (high titre individuals vs.

98   intermediate and low titre individuals combined; see figure 1). Success defined as high titre

99   individual. Variables were selected using a forward, stepwise approach using AIC. P-values

100 estimated by likelihood ratio test. Two-sided test.

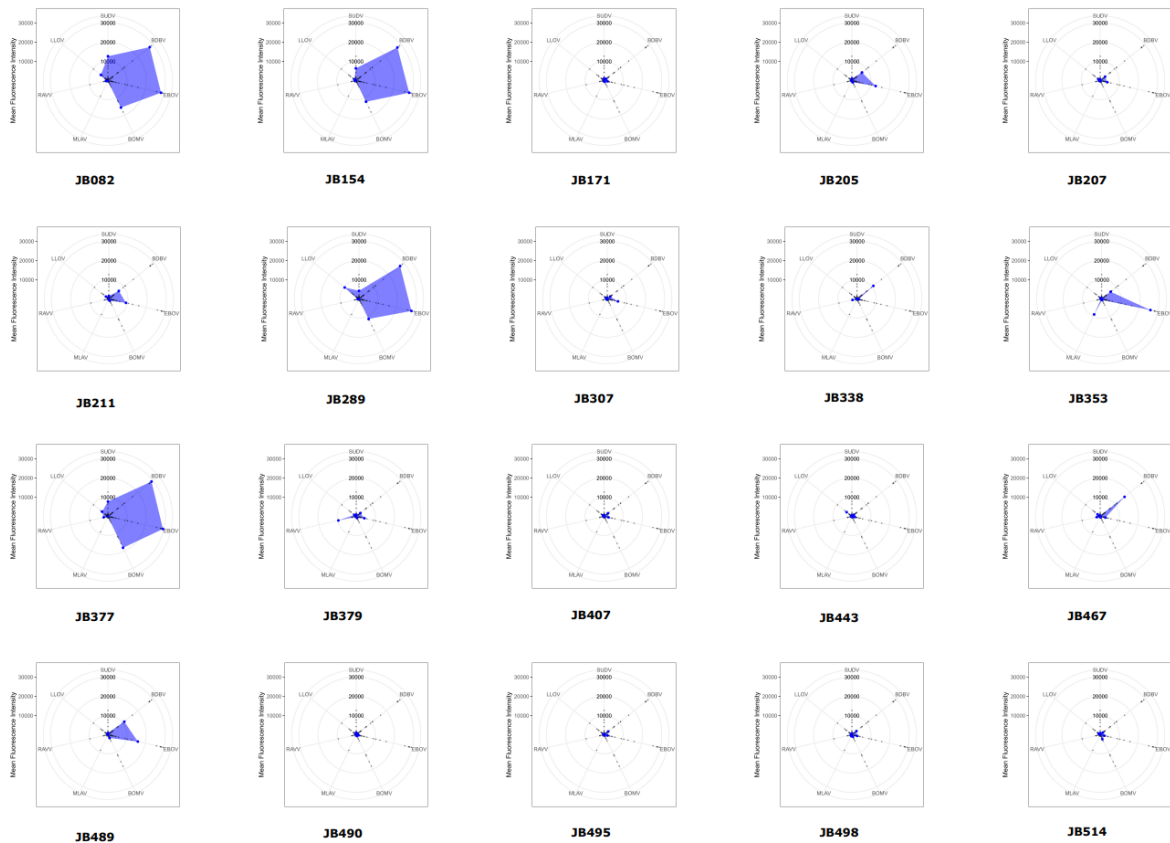101

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114 **Supplementary Figure 2**

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117 Individual serological profile of participants within group A (n=20). Shows antigen-specific

118 total binding IgG antibody response (median fluorescence intensity) against a multiplexed

119 panel of filovirus antigens. Detected by Luminex-based multiplexed microsphere binding

120 immunoassay