

1 **Supplement**

2 For some biomarkers, physiological dysregulation is bidirectional, such as cortisol⁷⁹⁻⁸²
3 and total cholesterol.⁸³⁻⁹³ Reflecting this bidirectional dysregulation, the multi-method approach
4 in this report uses a two-tailed split quartile (top and bottom 12.5%) for these two biomarkers.
5 However, we also tested ALIs with a one-tailed quartile for total cholesterol, as this is the
6 traditional approach in human clinical research. Results between these ALIs (Table S1) and those
7 presented in the main text for all-cause morbidity, cardiac disease, and mortality risk are
8 consistent and lead to the same conclusions. For biomarkers such as cortisol and total
9 cholesterol, we suggest testing ALIs using both one-tailed and two-tailed quartiles to determine
10 which works best for the biomarker in question and for the outcomes of interest.

11

12 **Table S1** – Risk of all-cause morbidity, cardiac disease, and mortality in western lowland gorillas (n = 60) as predicted by multi-
 13 model ALIs using a one-tailed quartile for total cholesterol. Risk was analyzed using binomial generalized linear models (GLMs) with
 14 logit links for each allostatic load index.
 15

ALI	Allostatic Load			p	Age		p	Sex		AICc
	p	OR	95% CI		OR	95% CI		OR	95% CI	
All-cause morbidity										
PS1 ALM	0.061	1.35	1.00-1.90							81.9
	0.334	1.23	0.82-1.93	0.0009	1.15	1.07-1.26	0.002	10.57	2.63-54.99	59.4
PS2 ALM	0.253	1.22	0.88-1.77							84.3
	0.718	0.92	0.57-1.45	0.0003	1.16	1.08-1.27	0.002	9.88	2.51-49.90	60.2
Cardiac disease										
PS1 ALM	0.241	1.19	0.89-1.28							85.4
	0.295	1.21	0.85-1.77	0.122	1.04	0.99-1.10	0.0004	11.23	3.25-48.87	72.5
PS2 ALM	0.797	0.96	0.68-1.33							86.7
	0.217	0.76	0.48-1.15	0.025	1.06	1.01-1.13	0.0003	11.42	3.32-48.66	72.0
Mortality risk										
PS1 ALM	0.056	1.37	1.00-1.93							76.7
	0.315	1.20	0.84-1.72	0.023	1.06	1.01-1.12				73.2
PS2 ALM	0.023	1.54	1.08-2.31							74.9
	0.141	1.35	0.91-2.07	0.030	1.06	1.01-1.11				72.0

16 Reference groups: all-cause morbidity and cardiac disease, 1=affected, mortality, 1=deceased; sex, male. AICc – Akaike’s information
17 criterion, adjusted for small sample size; ALI – allostatic load index; ALM – multi-method approach, allostatic load estimated using
18 primarily one-tailed quartiles but also some two-tailed split quartiles (top and bottom 12.5%), depending on the biomarker (e.g.,
19 cortisol); PS1 – pooled sample 1, allostatic load estimated at each zoo independently prior to pooling the sample; PS2 – pooled
20 sample 2, allostatic load estimated after pooling biomarkers from all locations