Accelerated Failure Time Model

Test name: Accelerated Failure Time Model

Dataset: D:\DATA ANALYSIS\H Regression Tests and Models\Accelerated Failure Time Model\dataset.csv

Rows in original dataset: 649

Columns in original dataset: 33

Rows used in AFT models: 649

Events: 151

Right censored: 498

Constructed survival time: aft_time = absences + 1

Constructed event indicator: G3 < 10 OR failures > 0

Numeric predictors: G1, G2, studytime, age, Medu, Fedu

Categorical predictors: school, sex, address

Models fitted: Log-Normal AFT and Weibull AFT by maximum likelihood with right censoring.

Best model by AIC: Weibull AFT

Strongest fitted acceleration term in Weibull AFT: school_MS with acceleration factor 0.6020.

Interpretation: exp(coefficient) is the acceleration factor / time ratio.

Acceleration factor > 1 means longer expected time to event; < 1 means shorter time to event.

Decision guide: p < 0.05 and acceleration-factor CI not crossing 1 indicates stronger evidence for a predictor effect.

Reporting guide: state survival time, event definition, censoring count, distribution, acceleration factors, 95% CIs, and model fit.

Charts generated: 8

AFT model fit statistics

model	n	events	right_censore	parameters	negative_log	log_likelihood	aic	bic	scale_or_sha	optimizer_su	optimizer_mes
Log-Normal A	649.0000	151.0000	498.0000	11.0000	498.1509	-498.1509	1018.3019	1067.5316	1.0813	1.0000	CONVERGENCE
Weibull AFT	649.0000	151.0000	498.0000	11.0000	489.1226	-489.1226	1000.2453	1049.4751	1.3842	1.0000	CONVERGENCE

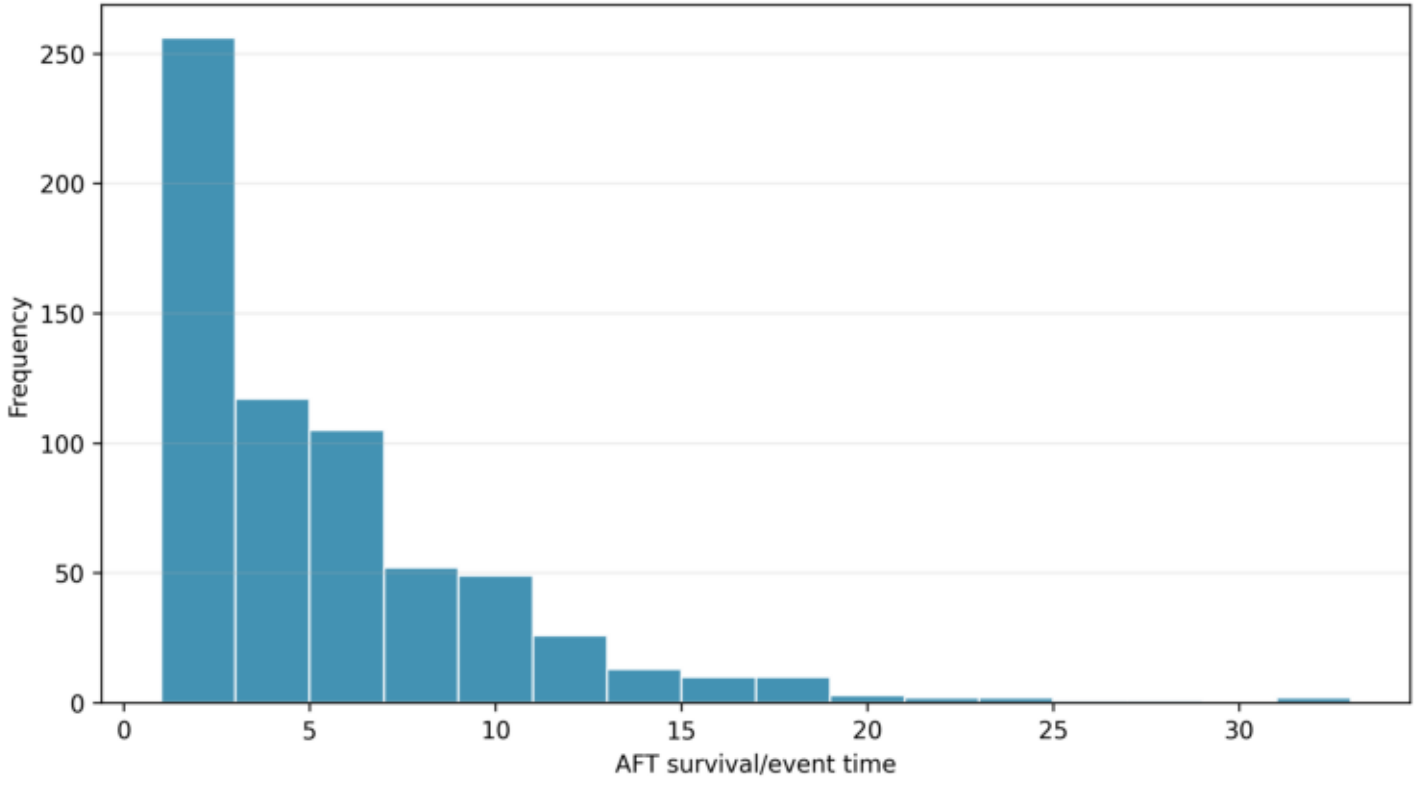
AFT acceleration coefficients

model	term	coefficient	standard_err	z_value	p_value	ci95_lower	ci95_upper	acceleration_	acceleration_	acceleration_	decision_alpha_
Log-Normal A	Intercept	-0.0767	64.2987	-0.0012	0.9990	-126.0999	125.9464				Not statistically
Log-Normal A	G1	0.1351	0.7558	0.1788	0.8581	-1.3463	1.6165	1.1447	0.2602	5.0356	Not statistically
Log-Normal A	G2	0.1937	1.9253	0.1006	0.9199	-3.5799	3.9672	1.2137	0.0279	52.8367	Not statistically
Log-Normal A	studytime	0.0444	1.9254	0.0231	0.9816	-3.7293	3.8182	1.0454	0.0240	45.5205	Not statistically
Log-Normal A	age	-0.0555	4.0166	-0.0138	0.9890	-7.9279	7.8169	0.9460	0.0004	2482.2117	Not statistically
Log-Normal A	Medu	0.0652	5.7535	0.0113	0.9910	-11.2114	11.3419	1.0674	0.0000	84279.6684	Not statistically
Log-Normal A	Fedu	0.0626	2.4266	0.0258	0.9794	-4.6933	4.8186	1.0646	0.0092	123.7875	Not statistically
Log-Normal A	school_MS	-0.4599	0.9412	-0.4886	0.6251	-2.3046	1.3849	0.6314	0.0998	3.9943	Not statistically
Log-Normal A	sex_M	-0.1856	4.3394	-0.0428	0.9659	-8.6907	8.3194	0.8306	0.0002	4102.8674	Not statistically
Log-Normal A	address_U	0.2004	2.1443	0.0935	0.9255	-4.0023	4.4031	1.2219	0.0183	81.7053	Not statistically
Log-Normal A	log_sigma	0.0782	1.9412	0.0403	0.9679	-3.7266	3.8829				Not statistically
Weibull AFT	Intercept	-0.0873	15.2773	-0.0057	0.9954	-30.0301	29.8556				Not statistically

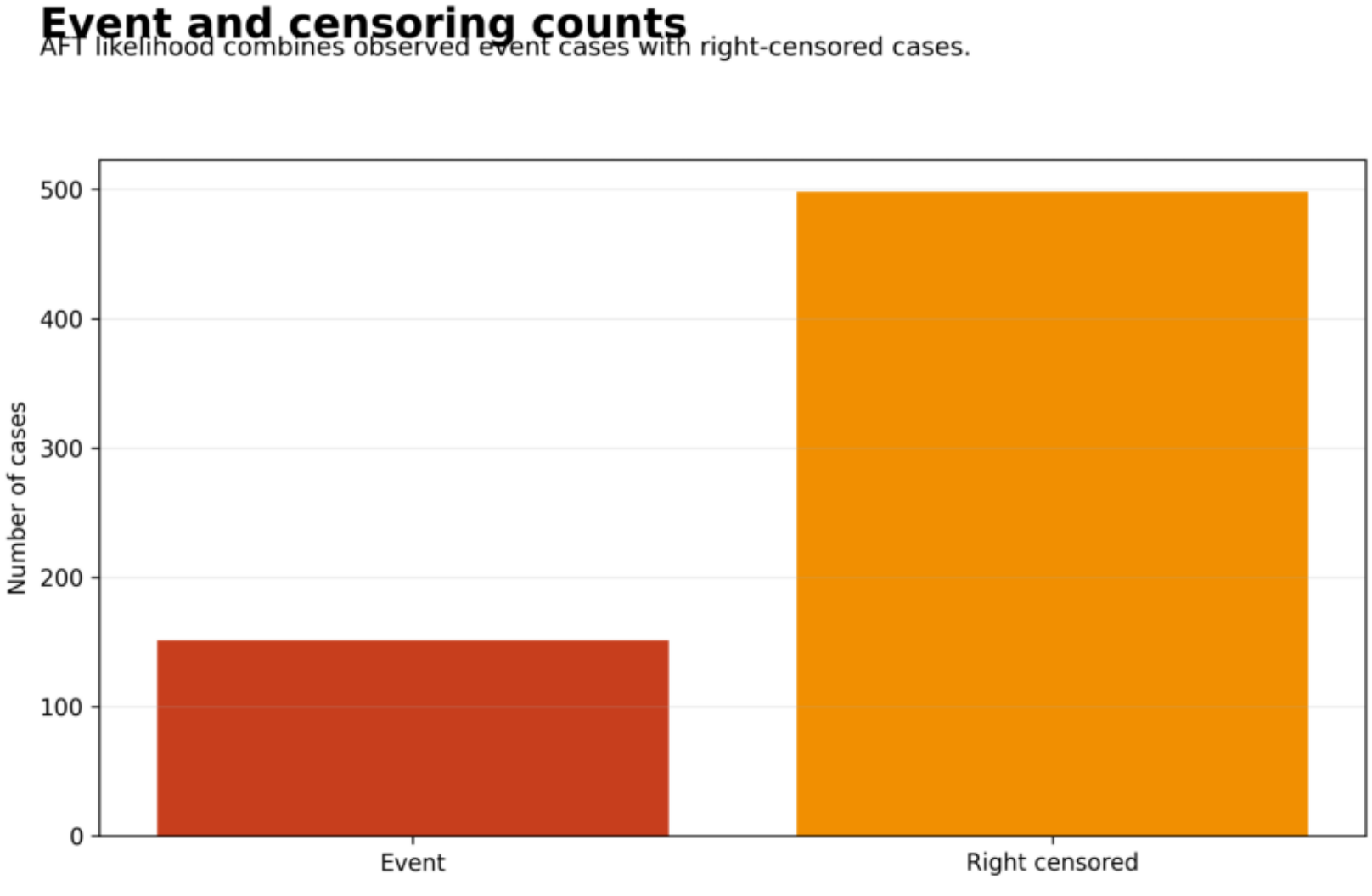
01_aft_time_to_event_distribution.png

AFT time-to-event distribution

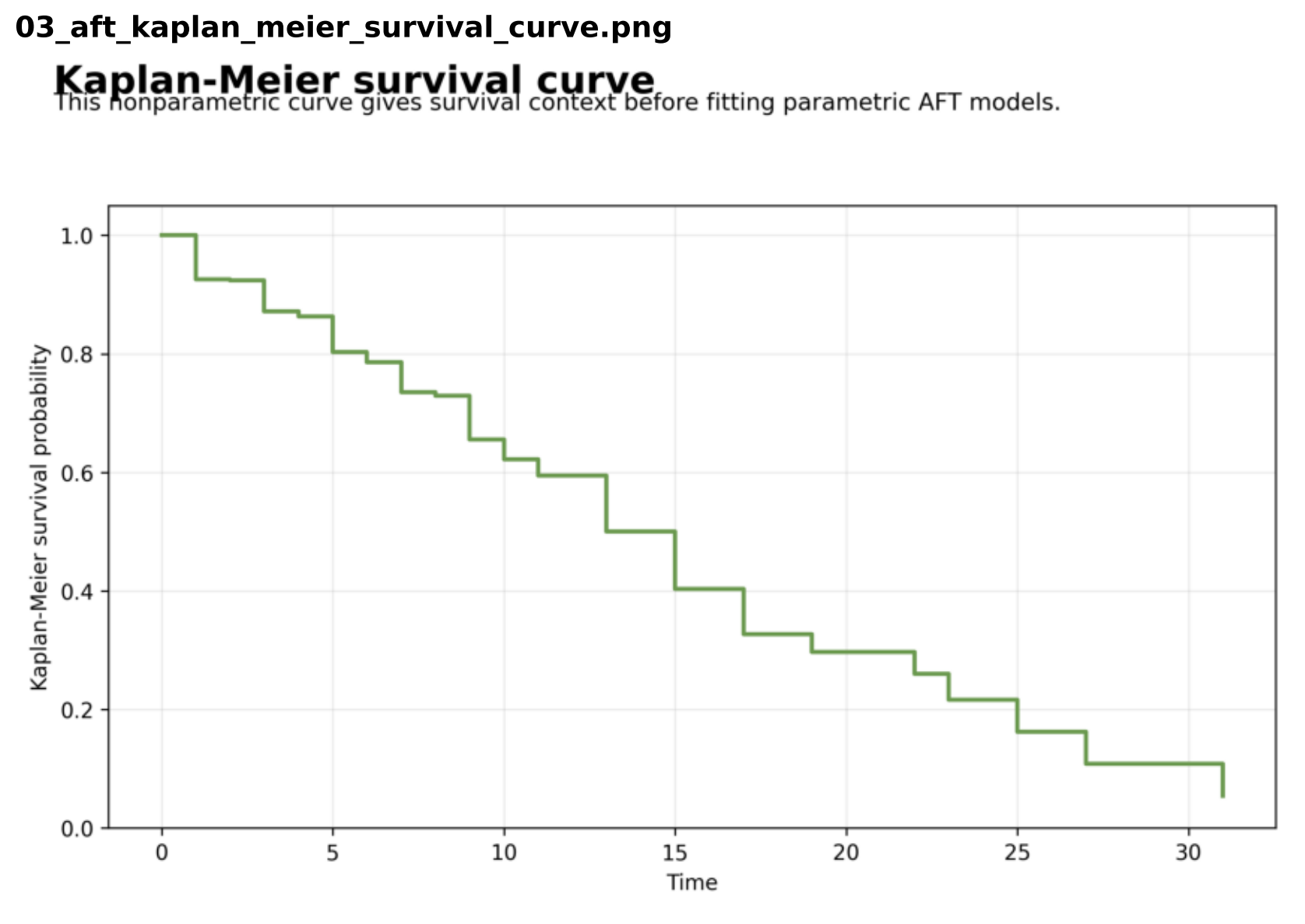
The model requires strictly positive duration values; constructed values use absences + 1 when no survival time exists.



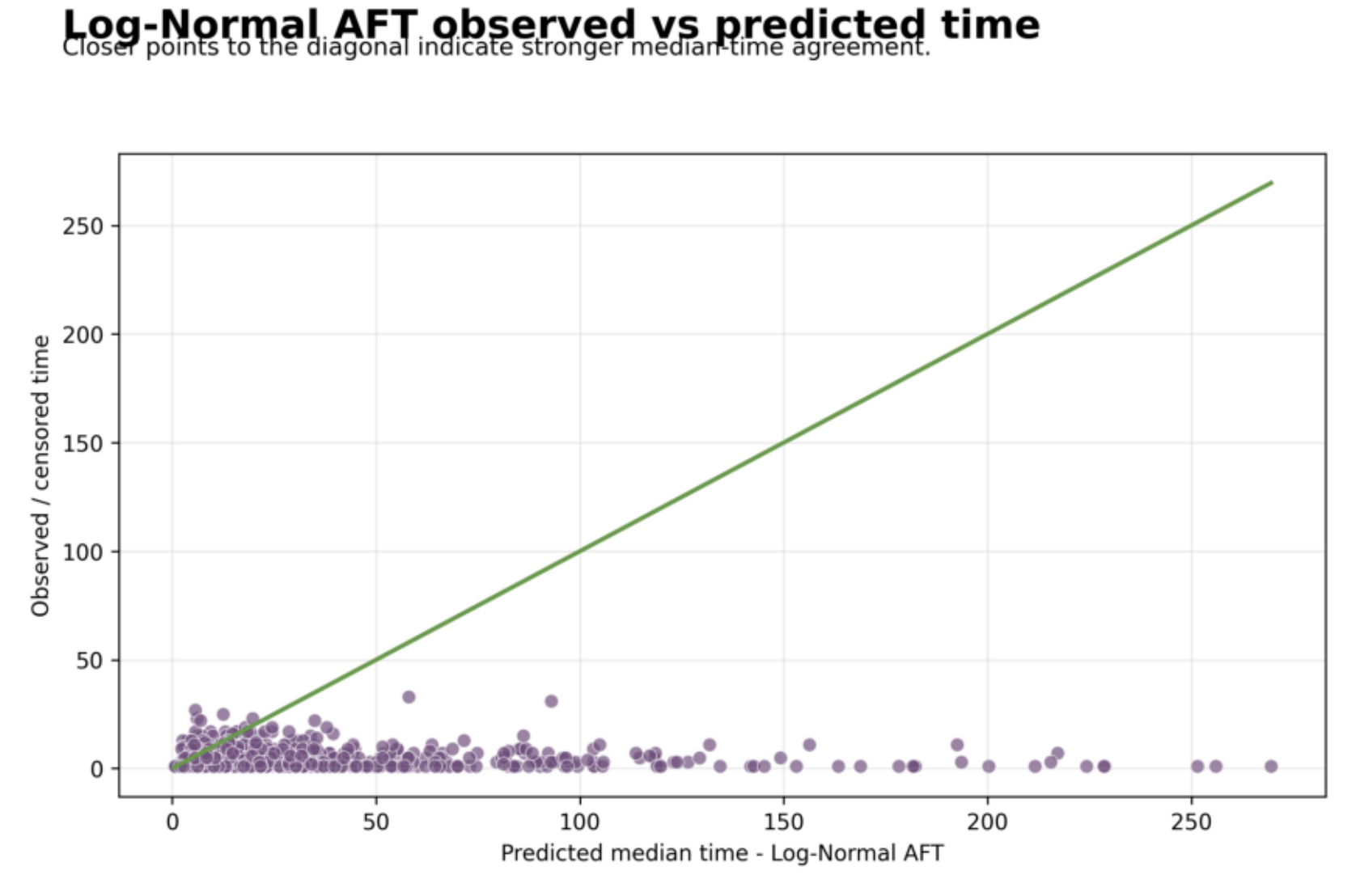
02_aft_event_censoring_counts.png



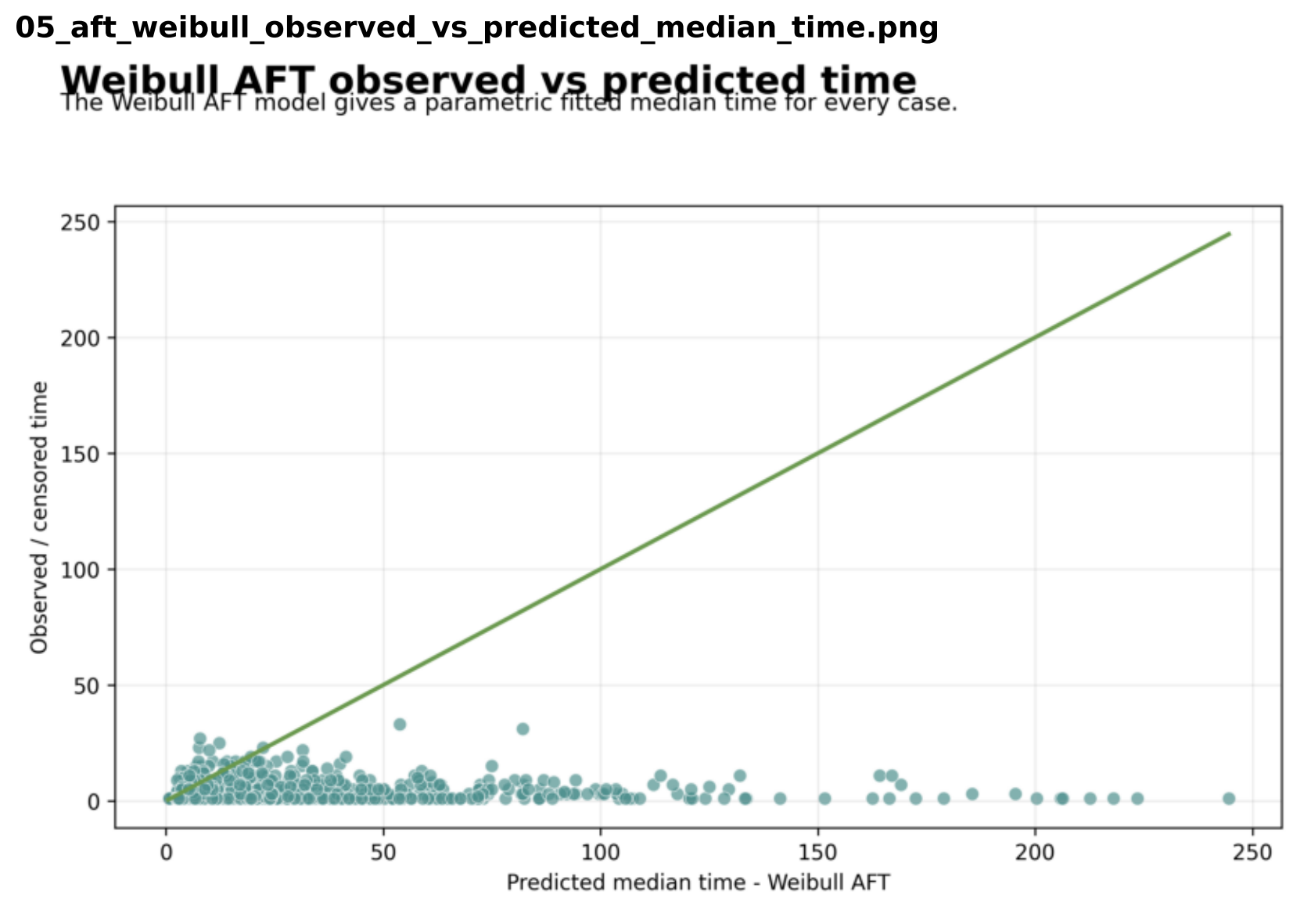
03_aft_kaplan_meier_survival_curve.png



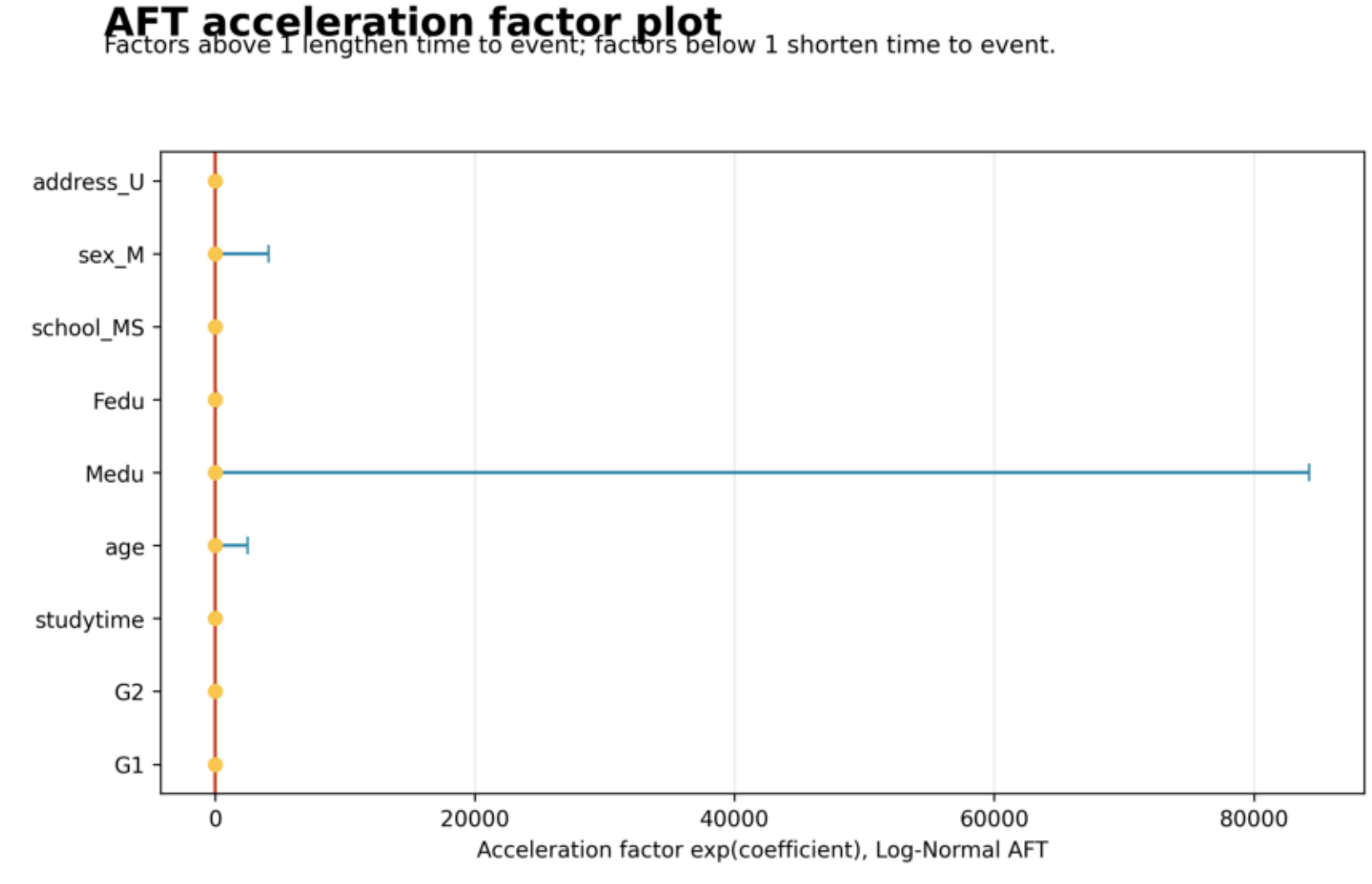
04_aft_lognormal_observed_vs_predicted_median_time.png



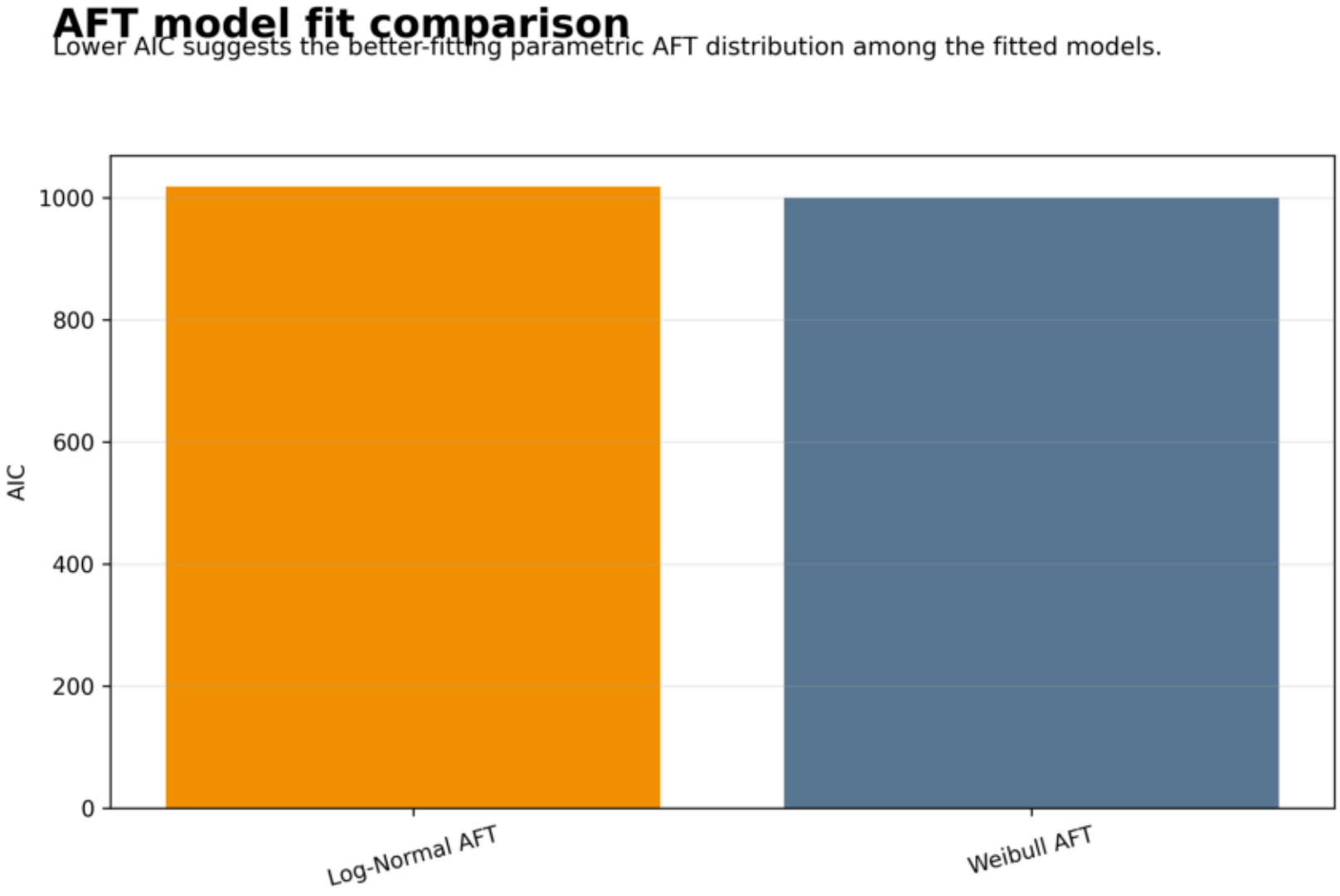
05_aft_weibull_observed_vs_predicted_median_time.png



06_aft_acceleration_factor_plot_lognormal.png



07_aft_model_fit_comparison.png



08_aft_predicted_survival_curves_lognormal.png