

# AMPATH Analysis Markov Assumption Check, from Engaged

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Model used here is multinomial logistic regression. The reference group of all models is **to engaged**.

*age* is dichotomized. Reference group is  $age \leq 35$ .

*male* is a binary variable with gender male = 1.

The reference group of cd4 arv variable is  $cd4 < 350$  and *arv-* (not on arv).

Calendar year and grid time are added in the model as smoothing lines.

Reported values are relative risk ratio (rrr). gam function in R package mgcv is used for fitting the model.

Table 1: Markov Assumption Check, From Eng, cd4 350

Model	Variable	rrr	2.5%	97.5%	Estimate	Std. Error	Pr(> z )
To: Dis1	(Intercept)	1.1	1.037	1.166	0.095	0.03	0.001
	ageGreaterThan35	0.623	0.606	0.642	-0.472	0.015	0
	male	1.097	1.064	1.131	0.093	0.015	0
	cd4art1	0.144	0.136	0.152	-1.938	0.029	0
	cd4art2	0.279	0.263	0.297	-1.275	0.031	0
	cd4art3	0.106	0.1	0.112	-2.246	0.031	0
	cd4art4	1.845	1.677	2.031	0.613	0.049	0
	cd4art5	0.298	0.276	0.321	-1.211	0.038	0
	cd4350_2>=350	0.927	0.886	0.971	-0.075	0.024	0.001
	cd4350_2missing	0.934	0.889	0.981	-0.068	0.025	0.006
To: Transfer Out	(Intercept).1	0.049	0.038	0.062	-3.02	0.121	0
	ageGreaterThan35.1	0.571	0.508	0.64	-0.561	0.059	0
	male.1	0.865	0.762	0.983	-0.145	0.065	0.026
	cd4art1.1	0.244	0.193	0.309	-1.411	0.12	0
	cd4art2.1	0.219	0.165	0.29	-1.52	0.144	0
	cd4art3.1	0.164	0.128	0.21	-1.809	0.127	0
	cd4art4.1	1.977	1.333	2.933	0.682	0.201	0.001
	cd4art5.1	0.606	0.437	0.842	-0.5	0.168	0.003
	cd4350_2>=350.1	0.946	0.784	1.142	-0.055	0.096	0.564
	cd4350_2missing.1	0.654	0.519	0.825	-0.424	0.118	0
To: Death	(Intercept).2	0.014	0.011	0.017	-4.292	0.123	0
	ageGreaterThan35.2	1.02	0.91	1.144	0.02	0.058	0.732
	male.2	1.562	1.405	1.736	0.446	0.054	0
	cd4art1.2	0.679	0.545	0.845	-0.388	0.112	0.001
	cd4art2.2	0.194	0.143	0.264	-1.638	0.156	0
	cd4art3.2	0.227	0.176	0.292	-1.483	0.129	0
	cd4art4.2	1.105	0.726	1.681	0.099	0.214	0.642
	cd4art5.2	0.688	0.505	0.937	-0.374	0.158	0.018
	cd4350_2>=350.2	0.951	0.798	1.133	-0.051	0.089	0.571
	cd4350_2missing.2	1.294	1.097	1.525	0.257	0.084	0.002

Table 2: Markov Assumption Check, From Eng, onarvcf

Model	Variable	rrr	2.5%	97.5%	Estimate	Std. Error	Pr(> z )
To: Dis1	(Intercept)	1.009	0.955	1.067	0.009	0.028	0.743
	ageGreaterThan35	0.625	0.607	0.643	-0.471	0.015	0
	male	1.1	1.067	1.134	0.095	0.015	0
	cd4art1	0.136	0.129	0.145	-1.992	0.03	0
	cd4art2	0.275	0.259	0.291	-1.292	0.03	0
	cd4art3	0.095	0.09	0.101	-2.35	0.032	0
	cd4art4	1.786	1.627	1.96	0.58	0.047	0
	cd4art5	0.268	0.249	0.288	-1.318	0.037	0
	onarvcf_21	1.182	1.134	1.232	0.167	0.021	0
	To: Transfer Out	(Intercept).1	0.037	0.03	0.047	-3.292	0.116
ageGreaterThan35.1		0.573	0.51	0.643	-0.557	0.059	0
male.1		0.869	0.765	0.987	-0.141	0.065	0.031
cd4art1.1		0.18	0.14	0.231	-1.717	0.127	0
cd4art2.1		0.232	0.177	0.303	-1.462	0.137	0
cd4art3.1		0.115	0.089	0.15	-2.16	0.133	0
cd4art4.1		1.495	1.035	2.158	0.402	0.187	0.032
cd4art5.1		0.317	0.233	0.43	-1.15	0.156	0
onarvcf_21.1		1.958	1.631	2.349	0.672	0.093	0
To: Death		(Intercept).2	0.014	0.011	0.018	-4.24	0.12
	ageGreaterThan35.2	1.017	0.907	1.14	0.017	0.058	0.774
	male.2	1.566	1.409	1.741	0.449	0.054	0
	cd4art1.2	0.679	0.542	0.85	-0.387	0.115	0.001
	cd4art2.2	0.188	0.139	0.253	-1.673	0.152	0
	cd4art3.2	0.221	0.171	0.284	-1.511	0.13	0
	cd4art4.2	1.261	0.833	1.907	0.232	0.211	0.273
	cd4art5.2	0.812	0.601	1.096	-0.209	0.153	0.174
	onarvcf_21.2	0.979	0.839	1.142	-0.021	0.079	0.785

Table 3: Markov Assumption Check, From Eng, engaged 0/1

Model	Variable	rrr	2.5%	97.5%	Estimate	Std. Error	Pr(> z )
To: Dis1	(Intercept)	3.686	3.412	3.982	1.305	0.039	0
	ageGreaterThan35	0.637	0.619	0.655	-0.452	0.015	0
	male	1.089	1.056	1.122	0.085	0.015	0
	cd4art1	0.154	0.146	0.163	-1.871	0.028	0
	cd4art2	0.283	0.267	0.3	-1.263	0.03	0
	cd4art3	0.112	0.106	0.119	-2.189	0.03	0
	cd4art4	1.765	1.608	1.937	0.568	0.047	0
	cd4art5	0.275	0.256	0.295	-1.292	0.036	0
	eng_2	0.252	0.237	0.268	-1.378	0.031	0
To: Transfer Out	(Intercept).1	0.081	0.058	0.112	-2.515	0.166	0
	ageGreaterThan35.1	0.579	0.516	0.65	-0.547	0.059	0
	male.1	0.862	0.759	0.98	-0.148	0.065	0.023
	cd4art1.1	0.259	0.206	0.325	-1.352	0.116	0
	cd4art2.1	0.221	0.169	0.289	-1.511	0.137	0
	cd4art3.1	0.17	0.134	0.216	-1.774	0.122	0
	cd4art4.1	1.54	1.066	2.224	0.432	0.188	0.021
	cd4art5.1	0.445	0.334	0.592	-0.81	0.146	0
	eng_2.1	0.522	0.401	0.679	-0.65	0.134	0
To: Death	(Intercept).2	0.03	0.021	0.041	-3.521	0.167	0
	ageGreaterThan35.2	1.027	0.916	1.151	0.026	0.058	0.65
	male.2	1.56	1.403	1.734	0.445	0.054	0
	cd4art1.2	0.692	0.557	0.86	-0.368	0.111	0.001
	cd4art2.2	0.193	0.143	0.26	-1.646	0.152	0
	cd4art3.2	0.228	0.178	0.292	-1.478	0.126	0
	cd4art4.2	1.242	0.821	1.879	0.217	0.211	0.304
	cd4art5.2	0.78	0.581	1.046	-0.249	0.15	0.097
	eng_2.2	0.456	0.353	0.589	-0.786	0.131	0

Table 4: Markov Assumption Check, From Eng, state\_2

Model	Variable	rrr	2.5%	97.5%	Estimate	Std. Error	Pr(> z )
To: Dis1	(Intercept)	0.926	0.877	0.978	-0.077	0.028	0.006
	ageGreaterThan35	0.637	0.619	0.656	-0.451	0.015	0
	male	1.089	1.056	1.122	0.085	0.015	0
	cd4art1	0.154	0.146	0.163	-1.869	0.028	0
	cd4art2	0.283	0.267	0.301	-1.261	0.03	0
	cd4art3	0.113	0.106	0.119	-2.185	0.03	0
	cd4art4	1.763	1.606	1.935	0.567	0.047	0
	cd4art5	0.273	0.255	0.293	-1.297	0.036	0
	state_221	3.462	3.18	3.769	1.242	0.043	0
	state_222	4.017	3.515	4.591	1.391	0.068	0
state_223	4.904	4.418	5.444	1.59	0.053	0	
To: Transfer Out	(Intercept).1	0.042	0.034	0.053	-3.167	0.113	0
	ageGreaterThan35.1	0.579	0.516	0.65	-0.546	0.059	0
	male.1	0.862	0.759	0.98	-0.148	0.065	0.023
	cd4art1.1	0.259	0.206	0.325	-1.351	0.116	0
	cd4art2.1	0.221	0.169	0.289	-1.51	0.137	0
	cd4art3.1	0.17	0.134	0.216	-1.772	0.122	0
	cd4art4.1	1.538	1.065	2.222	0.431	0.188	0.022
	cd4art5.1	0.443	0.333	0.589	-0.814	0.146	0
	state_221.1	1.732	1.184	2.532	0.549	0.194	0.005
	state_222.1	1.736	0.951	3.17	0.551	0.307	0.073
state_223.1	2.354	1.537	3.606	0.856	0.218	0	
To: Death	(Intercept).2	0.013	0.011	0.017	-4.315	0.118	0
	ageGreaterThan35.2	1.028	0.917	1.153	0.028	0.058	0.63
	male.2	1.56	1.404	1.734	0.445	0.054	0
	cd4art1.2	0.695	0.56	0.863	-0.364	0.111	0.001
	cd4art2.2	0.193	0.144	0.26	-1.643	0.152	0
	cd4art3.2	0.23	0.18	0.294	-1.47	0.126	0
	cd4art4.2	1.239	0.82	1.875	0.215	0.211	0.309
	cd4art5.2	0.769	0.573	1.032	-0.263	0.15	0.08
	state_221.2	1.551	1.046	2.3	0.439	0.201	0.029
	state_222.2	2.054	1.152	3.662	0.72	0.295	0.015
state_223.2	3.743	2.531	5.537	1.32	0.2	0	