Table 7.1 Number of Deaths from Lung Cancer, by Histology, Stage of Disease, and Follow-up Time Interval[a]

Follow-up Time Interval (months)	Disease Stage:	Histology								
		I			II			III		
		1	2	3	1	2	3	1	2	3
0–2		9	12	42	5	4	28	1	1	19
		(157	134	212	77	71	130	21	22	101)
2–4		2	7	26	2	3	19	1	1	11
		(139	110	136	68	63	72	17	18	63)
4–6		9	5	12	3	5	10	1	3	7
		(126	96	90	63	58	42	14	14	43)
6–8		10	10	10	2	4	5	1	1	6
		(102	86	64	55	42	21	12	10	32)
8–10		1	4	5	2	2	0	0	0	3
		(88	66	47	50	35	14	10	8	21)
10–12		3	3	4	2	1	3	1	0	3
		(82	59	39	45	32	13	8	8	14)
12+		1	4	1	2	4	2	0	2	3
		(76	51	29	42	28	7	6	6	10)

[a]Values in parentheses represent total follow-up months at risk.
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observations grouped into 2-month intervals of follow-up after the diagnosis. For each cell specifying a particular length of follow-up, histology, and stage of disease, the table shows the number of deaths and the number of months of observations of subjects still alive during that follow-up interval. We treat[2] the death counts in the table as independent Poisson variates.

Let μ_{ijk} denote the expected number of deaths and t_{ijk} the total time at risk for histology i and stage of disease j, in follow-up time interval k. The Poisson GLM for the death rate,

$$\log(\mu_{ijk}/t_{ijk}) = \beta_0 + \beta_i^{\mathrm{H}} + \beta_j^{\mathrm{S}} + \beta_k^{\mathrm{T}},$$

treats each explanatory variable as a qualitative factor, where the superscript notation shows the classification labels. It has residual deviance $G^2 = 43.92$ ($df = 52$). Models that assume a lack of interaction between follow-up interval and either prognostic factor are called *proportional hazards* models. They have the same effects of histology and stage of disease in each time interval. Then a ratio of hazards for two groups is the same at all times. Further investigation reveals that, although the stage of disease is an important prognostic factor, histology did not contribute significant additional

[2]This corresponds to a survival modeling approach that assumes piecewise exponential densities for survival times, yielding a constant hazard function in each two-month interval.