

# Running a Nelson-Aalen analysis with XLSTAT-Life

[demoNAA.xls](#)

## Dataset for the Nelson-Aalen analysis

An Excel sheet with both the data and results can be downloaded by clicking [here](#).

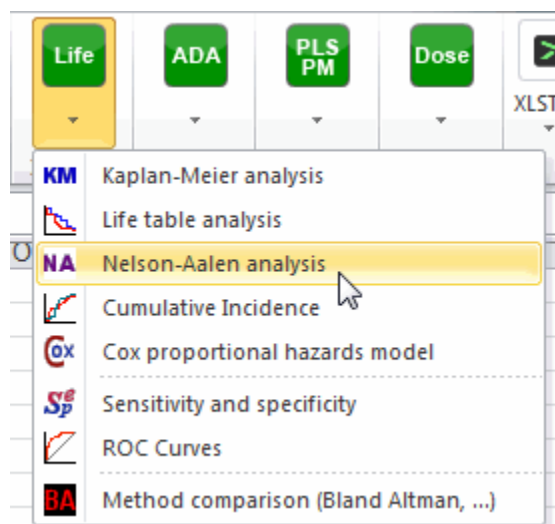
The data have been obtained in [Gehan E.A. (1965). A generalized Wilcoxon test for comparing arbitrarily singly-censored samples. *Biometrika*, 52, pp 203—223] and represent a randomized clinical trial investigating the effect of the drug 6-mercaptopurine on remission times (in weeks) of acute leukemia patients.

Our goal is to determine if and how the drug influences the survival time, by comparing the hazard curves for two groups of 21 patients, the first being treated, and the second being a control group. All 21 patients of the control group were observed to have a recurrence of their leukemia. Only 9 of the 6-MP patients had an observed recurrence time, while the 12 others were censored.

Nelson-Aalen estimation of cumulative hazard function should be preferred to Kaplan-Meier estimator when the user is interested in hazard functions.

## Setting up a Nelson-Aalen analysis

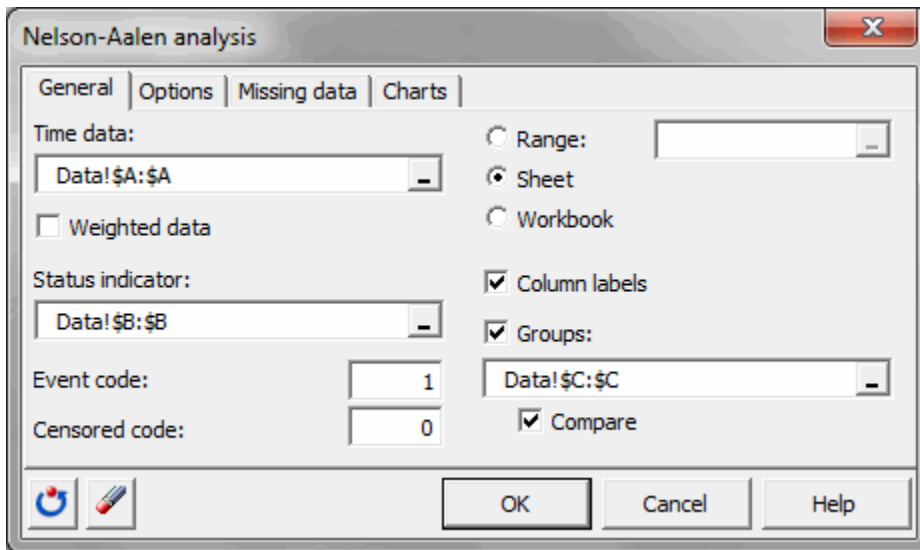
After opening XLSTAT, select the **XLSTAT / XLSTAT-Life / Nelson-Aalen analysis** command, or click on the corresponding button of the **XLSTAT-Life** toolbar (see below).



Once you've clicked on the button, the Nelson-Aalen analysis box will appear. Select the data on the Excel sheet.

The **Time data** corresponds to the durations when the patients either relapsed or were censored. The "Status indicator" describes whether a patient relapsed (event code=1) or was censored (censored code = 0) at a given time.

In order to have XLSTAT taking into account the information whether the patient belongs to the control or the treated group, we need to select the **groups** information, and to activate the **compare** option so that the comparison tests are computed.



The computations begin once you have clicked on **OK**. The results will then be displayed on a new Excel sheet.

## Interpreting the results of a Nelson-Aalen analysis

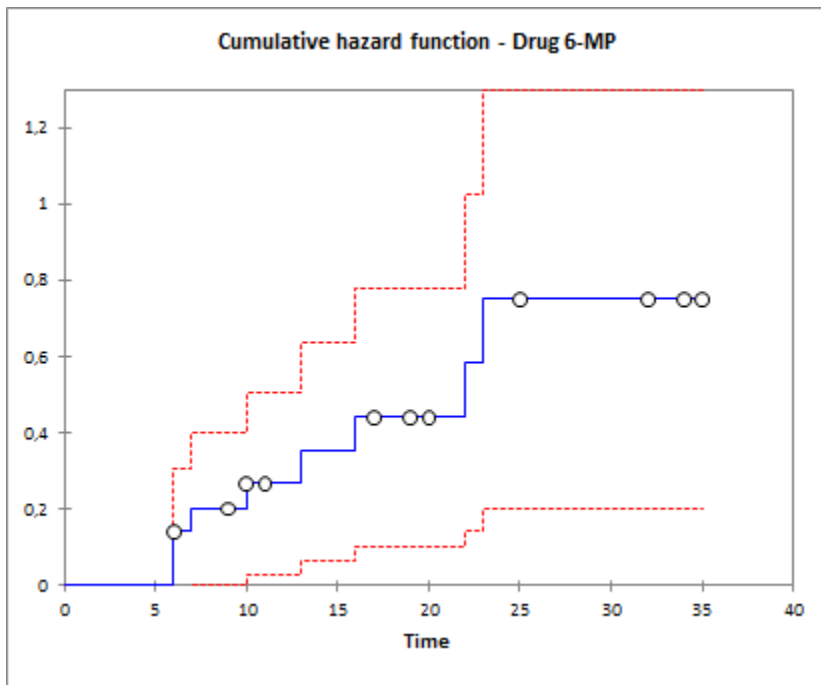
The results for the first group are displayed first. The first table displays a summary of the data for the "6-MP drug" patients.

Summary statistics (Drug 6-MP):		
Total observed	Total failed	Total censored
21	9	12

The next table corresponds to the "Nelson-Aalen table". It contains the results of the Nelson-Aalen analysis with several key indicators.

Nelson-Aalen analysis (Drug 6-MP):									
Time	At risk	Failed	Censored	Cumulative hazard function	Standard error	Lower bound	Upper bound	Survival distribution function	
6	21	3	1	0,143	0,082	-0,019	0,305	0,867	
7	17	1	0	0,202	0,101	0,003	0,400	0,817	
9	16	0	1	0,202	0,101	0,003	0,400	0,817	
10	15	1	1	0,268	0,121	0,031	0,506	0,765	
11	13	0	1	0,268	0,121	0,031	0,506	0,765	
13	12	1	0	0,352	0,147	0,063	0,640	0,704	
16	11	1	0	0,443	0,173	0,104	0,782	0,642	
17	10	0	1	0,443	0,173	0,104	0,782	0,642	
19	9	0	1	0,443	0,173	0,104	0,782	0,642	
20	8	0	1	0,443	0,173	0,104	0,782	0,642	
22	7	1	0	0,585	0,224	0,146	1,025	0,557	
23	6	1	0	0,752	0,279	0,204	1,300	0,471	
25	5	0	1	0,752	0,279	0,204	1,300	0,471	
32	4	0	2	0,752	0,279	0,204	1,300	0,471	
34	2	0	1	0,752	0,279	0,204	1,300	0,471	
35	1	0	1	0,752	0,279	0,204	1,300	0,471	

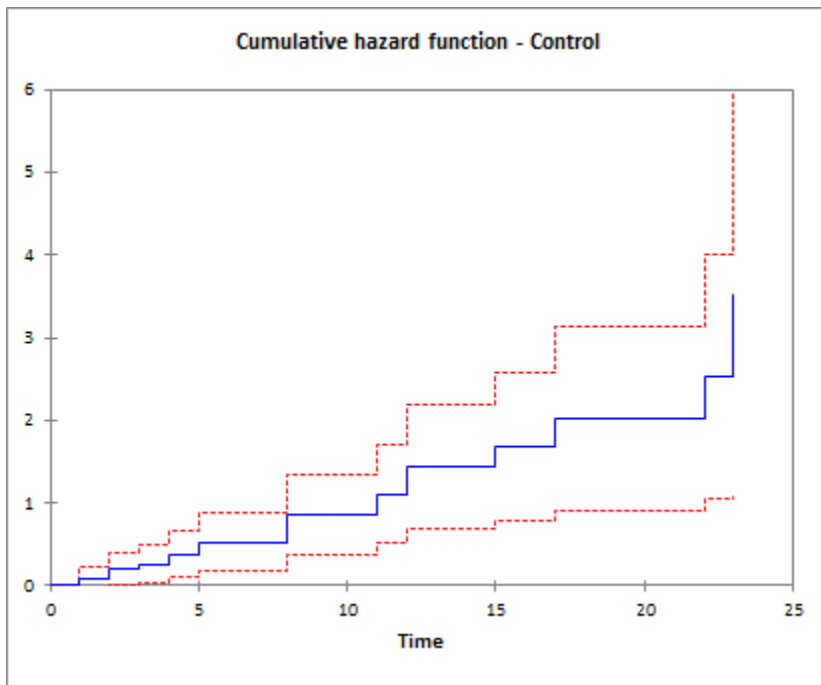
Then, we can visualize several curves, including the cumulative hazard function, bounded by the confidence intervals. The circles identify the censored data.



Next, the same series of results is displayed for the control group.

Summary statistics (Control):		
Total observed	Total failed	Total censored
21	21	0

Nelson-Aalen analysis (Control):									
Time	At risk	Failed	Censored	Cumulative hazard function	Standard error	Lower bound	Upper bound	Survival distribution function	
1	21	2	0	0,095	0,067	-0,037	0,227	0,909	
2	19	2	0	0,201	0,100	0,004	0,397	0,818	
3	17	1	0	0,259	0,116	0,031	0,487	0,772	
4	16	2	0	0,384	0,146	0,098	0,671	0,681	
5	14	2	0	0,527	0,178	0,179	0,875	0,590	
8	12	4	0	0,861	0,244	0,383	1,338	0,423	
11	8	2	0	1,111	0,301	0,521	1,700	0,329	
12	6	2	0	1,444	0,382	0,695	2,193	0,236	
15	4	1	0	1,694	0,457	0,799	2,589	0,184	
17	3	1	0	2,027	0,565	0,919	3,135	0,132	
22	2	1	0	2,527	0,755	1,048	4,007	0,080	
23	1	1	0	3,527	1,253	1,072	5,983	0,029	



Then, we can compare the two groups. First, a series of tests is displayed in a table. From the results we can see that the difference between the two survivor functions is very significant.

Test of equality of the survival distribution functions (DF = 1):				
Statistic	Observed value	Critical value	p-value	alpha
Log-rank	16,793	3,841	< 0,0001	0,050
Wilcoxon	13,458	3,841	0,000	0,050
Tarone-Wa	15,124	3,841	0,000	0,050

Last the comparison of the two hazard curves allows us to conclude to confirm that the drug impacts significantly negatively the hazard to which the patients are exposed.

