
Neuroblastoma Incidence in Illinois: 1986-1997

Neuroblastoma is one of the most commonly diagnosed solid tumors in young children. The disease originates from neural cell ectoderm that gives rise in the developing fetus to the sympathetic nervous system, the adrenal medulla, and the adrenergic and cholinergic neuroblasts along the sympathetic chain and cranial ganglia. The annual incidence rate among children under 15 years of age in the United States is nine to 11 cases per million (1). In Illinois, according to data reported to the Illinois State Cancer Registry from 1986 through 1997, the annual incidence rate was 10.5 per million. Neuroblastoma incidence at state and county levels has been reported previously for 1986 through 1994 by the Illinois State Cancer Registry (2). The current study updates the previous report through adding three more recent years of data to the original analysis.

During the 12-year period from 1986 to 1997, there were 322 neuroblastoma cases among children less than 15 years of age in Illinois. Table 1 lists numbers of neuroblastoma cases by county (shown on the second column). As expected, large counties, such as Cook, DuPage and Lake, tended to have more cases. To adjust for the effect of county size, expected numbers of cases were calculated based on the state average and a Poisson probability of observing less than actual cases was computed for each county (the third column). The higher the Poisson probability (ranging from 0 to 1), the more likely that the observation is not due to chance. Thus, in Table 1, using the conventional probability level of 0.95, four counties – Christian, McHenry, Macoupin and Vermilion – were judged as having statistically higher-than-expected incidence during the period 1986 to 1997. Adams County, which was significant in the previous analysis, was no longer so when more recent years of data were considered.

When corrected for multiple comparison biases caused by simultaneously testing multiple counties, the probability level of 0.95 was raised to 0.9995 according to the Bonferroni adjustment. At this level, Christian was the only county showing a statistically significant excess, with one case expected and seven cases actually observed.

The time trend of Poisson probability of neuroblastoma incidence by county is shown in Figure 1 for four consecutive and equally-spaced time periods from 1986 to 1997. Higher-than-expected incidence, as evaluated by a Poisson probability greater than 0.95, was observed for several counties during one time period. Christian and McHenry counties had higher-than-expected incidence for two time periods (i.e., 1986 to 1991 for Christian, and 1986 to 1988, 1992 to 1994 for McHenry). No counties exhibited excesses for more than two time periods.

The present analysis indicated again that neuroblastoma incidence among Illinois children, at least at the county level, was not homogenous in spatial and temporal distributions. As in the previous study, Christian County was identified as having a statistically significant neuroblastoma cluster that was confined to the time period 1986 to 1991. In addition, McHenry County was identified in the present analysis as having higher-than-expected incidence for two time periods. All the counties that had significant overall excesses ceased showing excesses during the most recent time period, 1994-1997.

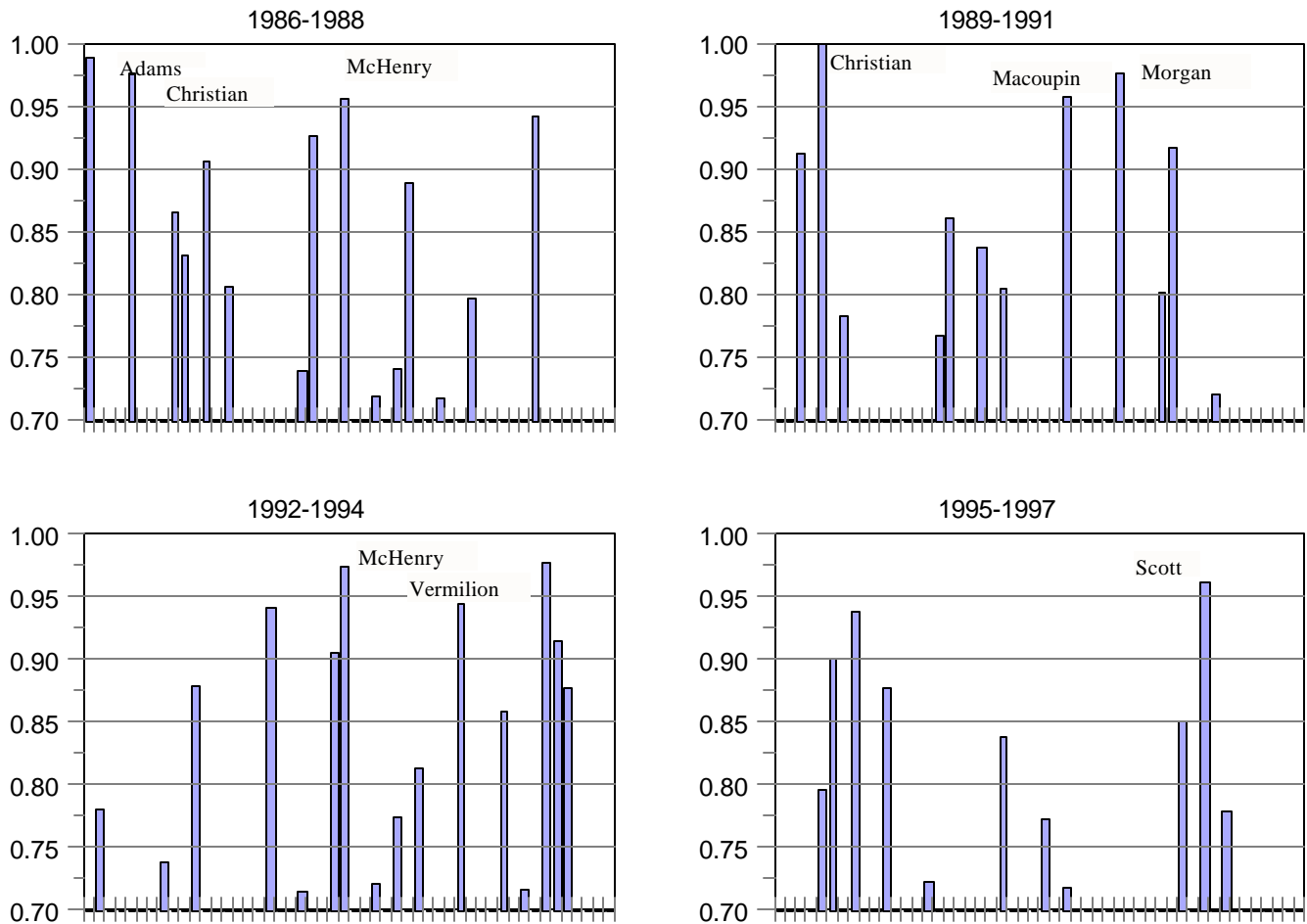
Table 1. Neuroblastoma Incidence by County and Poisson Probability of Observing Less Than Actual Cases, Illinois, 1986-1997

County	No.	Prob.	County	No.	Prob.
Adams	4	0.8856	McClellan	4	0.5735
Bureau	1	0.3690	Macon	1	0.0388
Cass	1	0.6942	Macoupin	5	0.9888
Champaign	3	0.2228	Madison	1	0.0010
Christian	7	0.9999	Marion	2	0.6678
Clark	1	0.6586	Mason	1	0.6339
Clinton	1	0.3708	Montgomery	1	0.4348
Cook	147	0.7416	Morgan	2	0.7592
Douglas	1	0.5575	Ogle	1	0.2496
DuPage	29	0.8724	Peoria	4	0.2571
Edgar	2	0.9015	Pulaski	1	0.7927
Ford	1	0.6786	Randolph	2	0.7764
Henry	1	0.2287	Rock Island	4	0.4142
Iroquois	1	0.4264	St. Clair	8	0.4449
Jackson	1	0.2813	Sangamon	6	0.6068
Jefferson	1	0.3437	Scott	1	0.8558
Jo Daviess	1	0.5461	Stephenson	2	0.6158
Johnson	1	0.7843	Tazewell	6	0.8597
Kane	5	0.0183	Vermilion	6	0.9636
Kankakee	2	0.2041	Wabash	1	0.6986
Kendall	2	0.6172	Warren	1	0.5899
Lake	21	0.8641	Whiteside	1	0.1613
La Salle	2	0.2119	Will	9	0.1461
Lawrence	1	0.6637	Williamson	1	0.2274
McHenry	11	0.9482	Winnebago	3	0.0248

Source: Illinois Department of Public Health, Illinois State Cancer Registry, April 2000

Note: Counties with no cases were omitted.

Figure 1. Neuroblastoma Incidence by County and Time Period: Poisson Probability of Observing Less Than Actual Cases, Illinois



Source: Illinois Department of Public Health, Illinois State Cancer Registry, April 2000

Note: Counties with a probability less than 0.70 were not shown, counties with a probability greater than 0.95 were marked by county names, and counties with a probability between 0.70 and 0.95 were shown but not marked by name.

References

1. Bernstein ML, Leclerc JM, Bunin G. A population-based study of neuroblastoma incidence, survival, and mortality in North America. *Journal Clinical Oncology* 10:323-9, 1992.
2. Illinois State Cancer Registry. Neuroblastoma incidence in Illinois: 1986-1994. *The Health and Hazardous Substances Registry Newsletter*. Illinois Department of Public Health, Springfield, IL. Summer 1996. pp2-3.