Tennessee Social Indicator Study (1999)

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ABSTRACT

The Tennessee Social Indicator Study is an ongoing effort to collect and analyze county-level indicators that correspond to a set of risk and protective factors for adolescent substance abuse. The social indicator study is based on a public health model that focuses on the factors that protect or put adolescents at risk (Hawkins, Catalano, & Miller, 1992). In the model the factors that protect and put individuals at risk for substance abuse comprise four broad domains: community, family, school, and peer/individual. A set of 38 archival social indicator variables was collected for each of Tennessee's 95 counties. Then a hierarchical principal component analysis was conducted to reduce the indicator variables to four domain-based risk factors and a combined Overall risk factor. Correlations among the five risk factors and correlations of the factors with juvenile arrest rates were reviewed in order to assess the validity of the model in Tennessee. Overall, the analyses supported the validity of the Community, Family, Peer/Individual, and Overall risk factors. County-level and regional risk-factor scores indicating relative-risk levels are presented, and their use in needs assessment and prevention planning is discussed.

Introduction

The Tennessee Social Indicator Study is an ongoing effort to collect and analyze county-level indicators corresponding to a set of risk and protective factors that have been shown to affect adolescent substance abuse. The study, is part of a larger Tennessee Needs Assessment Project supported by the Center for Substance Abuse Prevention (CSAP). The study is being conducted in the Research Section of the Bureau of Health Informatics (BHI) in the Tennessee Department of Health in cooperation with the Bureau of Alcohol and Drug Abuse Services (BADAS). The Tennessee Needs Assessment Project also includes a Community Resource Survey and a Middle School Survey, which are being conducted by the Community Health Research Group at the University of Tennessee Knoxville. Together, the Social Indicator Study and the two surveys will provide BADAS and community-health planners with much of the information necessary to determine the levels and types of prevention services that are required for children in Tennessee. The data presented in this report correspond to the year 1999. Currently, we are in the process of compiling data for the year 2000, and as soon as that data is analyzed we will begin data collection for 2001. With multiple years of data it will also be possible to evaluate trends and stability of the various indicators.

The social indicator study is based on a public health model that focuses on the factors that protect or put adolescents at risk for substance use and abuse (Hawkins, Kosterman, Maguin, Catalano, & Arthur, 1997; IOM, 1994). According to Hawkins and his colleagues, the factors that protect and put individuals at risk for drug and alcohol abuse comprise four broad domains: community, family, school, and peer/individual (Hawkins, Catalano, & Miller, 1992; see also, Brook, Nomura, & Cohen, 1989). Altogether, the variables in the archival social indicator list provide multiple markers for each of the four domains. A basic assumption of the public health model, and the archival indicators list, is the social structure represented in the four domains can be used to determine the need for prevention services in a given community. Given our analyses support the validity of the public health four-domain model in Tennessee, compiling and analyzing the indicator data should provide important information to guide Tennessee's prevention efforts.

The community, family, school, and peer/individual domains can be further divided into subdomains representing more specific aspects of the broader constructs. For example, community encompasses such areas as transitions and mobility, and extreme economic deprivation, which represent the stability and economic health of a community, respectively. Both of these variables are significantly correlated with adolescent substance use and abuse (Fagan, 1988; Simcha-Fagan & Schwartz, 1986; Robins & Ratcliff, 1979; Ryan, Abderahman, French, & Rodriguez, 1999). Similarly, the family domain can be divided into subdomains such as family drug use and family management practices, which have also been shown to affect adolescent drug abuse (Brook, Gordon,

Whiteman, & Cohen, 1986; Brook, Whiteman, Gordon, & Brook, 1988; Kandel & Andrews, 1987). Additionally, it has been shown that the effect of risk factors is cumulative and interactive (Brook et al., 1989; Bry, McKeon, & Pandina, 1982; Newcomb, Maddahian, & Bentler, 1986; Newcomb, Maddahian, Skager, & Bentler, 1987). Thus, individuals exposed to multiple risk factors are increasingly likely to abuse alcohol and drugs, and their level of abuse is more extreme. Conversely, individuals exposed to only one or two risk factors are not as likely to become substance abusers. Altogether, these findings show there is not a single pathway to drug use and abuse, but different complexes of multiple risk factors. Thus, Hawkins et al. (1992) suggest that risk-based need assessments should be followed by multidimensional interventions aimed at alleviating the specific problems faced by communities with the greatest levels of risk (e.g., Bry, Catalano, Kumpfer, Lochman, & Szapocznik, 1998; Hill, Howell, Hawkins, Battin-Pearson, 1999).

Social Indicator Variables

In the first-year data collection we were able to obtain county-level measures for 38 of the 40 archival indicators contained in the list: *Validated Archival Indicators of Risk and Outcome Variables that Predict Problem Behavior.* The list was developed by CSAP and six pilot-study states to be used by participants in the CSAP-supported *State Prevention Needs Assessment Studies*. The list of indicators that were obtained in the first-year data collection, the risk factor they are related to, and the source they were obtained from are presented in Table 1.

Table 1. Identified Risk Factors and Data Sources

Risk Factor	Data Source
Availability of Drugs	
Alcohol Sales Outlets	Tennessee Department of Revenue
Transitions and Mobility	
New Home Construction	U.S. Census Bureau
Households In Rental Properties	U.S. Census Bureau
Net Migration	U.S. Census Bureau
Low Neighborhood Attachment and Community Disorganization	
Population Voting In Elections	Office of the Secretary of State
Prisoners In State And Local Correctional Systems	Tennessee Department of Correction
Extreme Economic and Social Deprivation	
Unemployment	Tennessee Department of Labor and Workforce Development
Free And Reduced Lunch Program	Tennessee Department of Education

Aid To Families With Dependent Children	Tennessee Department of Human Services
Food Stamp Recipients	Tennessee Department of Human Services
Adults W/O High School Diploma	U.S. Census Bureau
Single Parent Family Households	U.S. Census Bureau
Family History of Substance Abuse	
Adults In AOD Treatment Program	Tennessee Department of Health
Substance Use	
Juvenile Alcohol Related Arrests	FBI Unified Crime Report
Juvenile Drug Related Arrests	FBI Unified Crime Report
Adult Alcohol Related Arrests	FBI Unified Crime Report
Adult Drug Related Arrests	FBI Unified Crime Report
Adult Drunken Driving Arrests	FBI Unified Crime Report
Alcohol Related Traffic Fatalities	Tennessee Department of Safety
Drug Use During Pregnancy	Tennessee Department of Health
Violence	
Juvenile Arrests For Violent Crimes	FBI Unified Crime Report
Adults Arrests For Violent Crimes	FBI Unified Crime Report
Homicides	Tennessee Department of Health
Nonviolent Crime	
Juvenile Arrests For Curfew, Vandalism, And Disorderly Conduct	FBI Unified Crime Report
Juvenile Arrests For Property Crimes	FBI Unified Crime Report
Adult Arrests For Property Crimes	FBI Unified Crime Report
Suicide	
Adolescent Suicide	Tennessee Department of Health
Adolescent Sexual behavior	
Adolescent Pregnancies	Tennessee Department of Health
Birthrate Among Juveniles	Tennessee Department of Health
Family Management Problems	
Children Living Away From Parents	U.S. Census Bureau
Children Living In Foster Care	Tennessee Department of Children's Services
Family Conflict	
Divorce	Tennessee Department of Health
Child Abuse	Tennessee Bureau of Investigation
Low Commitment to School	
Event Dropouts	Tennessee Department of Education
Early Initiation of Problem Behavior	
Dropouts Prior To 9th Grade	Tennessee Department of Education
Vandalism Arrests, Ages 10-14	Tennessee Department of Juvenile Justice
Alcohol Related Arrests, Ages 10-14	Tennessee Department of Juvenile Justice
Personal and Property Crimes, Ages 10-14	Tennessee Department of Juvenile Justice

Data Analysis

The 38 indicator variables (see Table 1) were obtained for each of Tennessee's 95 counties. The raw data were screened for missing and implausible values, processed as necessary and archived in electronic SAS data files. Initial analyses included calculating statewide means and standard deviations for each of the variables and obtaining simple correlation coefficients in order to determine the statewide relationships among the 38 variables. Subsequently, a statistical procedure known as hierarchical principal component analysis was used to reduce the individual indicator variables into four factors that correspond to the risk levels associated with each of the four domains: Community, Family, Peer/Individual, and School. A separate Overall risk factor, which is a weighted composite of the domain-based risk factors, was also created. Additionally, factor scores showing a county's level on each of the five factors were computed. Correlations among the five risk-factor scores are presented in Table 2.

Table 2. Risk-Factor Correlations

Risk Factor	Risk Factor				
	1	2	3	4	5
1. Community	1.00				
2. Family	.34***	1.00			
3. Peer/Individual	.11	.23*	1.00		
4. School	-.04	-.01	.10	1.00	
5. Overall	.71***	.80***	.57***	.04	1.00

Note: *$p < .05$; **$p < .01$; ***$p < .001$; N = 95

The correlations in Table 2 show the relationships among the four domain-based risk factors and the Overall risk factor. The statistically significant correlations between the Community and Family and Family and Peer/Individual risk factors, $r = .34$ $p < .001$ and $r = .23$ $p < .05$, are consistent with the expected relationships among these factors. That the correlations are also relatively small shows a degree of independence among the Community, Family, and Peer/Individual risk factors. The statistically significant and relatively large correlations of the Community, Family, and Peer/Individual risk factors with the Overall risk factor, $r = .71$ and $r = .80$ and $r = .57$ (all $p < .001$), respectively, show their relative contribution to the Overall risk factor. Altogether, these correlations demonstrate a pattern that supports the validity of the Community, Family, Peer/Individual, risk factors, that is, the three factors represent separate but related dimensions that are linked to a common Overall risk factor. However, the lack of a significant correlation for the School risk factor with the Overall risk factor or any of the other domain-based risk factors suggests a lack of meaningful variance in the School factor. This likely resulted from the meager representation of school-related variables in the present data collection. The School factor was based entirely on

the *event dropout* and *dropouts prior to the ninth grade* variables (see Table 1). For the 2000-2001 and 2001-2002 data collections we are attempting to broaden our collection of school related variables. Given the archival nature of these data collections, we will also retroactively attempt to broaden the school-related data collection for 1999-2000.

Correlations among the five risk-factor scores and juvenile arrest rates for drug, alcohol, violence-related, and property crimes are presented in Table 3. The Overall and Peer/Individual risk factors were significantly correlated with all four arrest rates, whereas the Community risk factor was significantly correlated with all but alcohol-related arrest rates. All of the risk factors were significantly correlated with violence-related arrest rates and all but the School risk factor had statistically significant correlations with property-crime arrest rates. Altogether, these correlations show the predictive validity of the Community, Family, Peer/Individual and Overall risk factors. In particular, the Overall factor appears to be an especially good predictor in that it relates to all four arrest rates and it represents a weighted composite of the Community, Family, and Peer/Individual risk factors. That the correlations of the Family factor with drug and alcohol arrest rates and the Community factor with alcohol arrest rates are statistically nonsignficant suggests that the data collection for these domains could also be improved. For now, it would seem most appropriate to use the Overall risk factor as the primary indicator of substance abuse risk and need for prevention services. It is the broadest of the five risk factors and demonstrated relatively good prediction. The domain-based factor scores could then be used as supplemental information to further guide decisions regarding types or targets of interventions.

Table 3 Risk Factor Correlations with Juvenile Arrest Rates for Drug, Alcohol, Violence-Related, and Property Crimes

Risk Factor Score	Juvenile Arrests			
	Drug	Alcohol	Violence	Property
1. Community	.27**	.16	.40***	.45***
2. Family	.19	.18	.37***	.30**
3. Peer/Individual	.54***	.37***	.47***	.36***
4. School	.14	-.06	.21*	.08
5. Overall	.45***	.32**	.58***	.52***

Note: *$p < .05$;   **$p < .01$;   ***$p < .001$; N = 95

Risk-Factor Scores

County-level risk-factor scores and quartile rankings of the risk-factor scores sorted on Overall risk are presented in Table 4. The risk-factor scores are standard scores, that is, they have a mean of zero and a standard deviation of one. Positive scores are above the mean and negative scores are below the mean. Higher scores indicate higher risk and lower scores indicate lower risk. For

planning purposes it is probably best to think of these scores as relative rather than absolute measures. In other words, a score of 2.0 indicates greater risk than a score of 1.0, but not necessarily twice as much risk. Additionally, small differences in scores may represent measurement error and should not be over-interpreted. In this regard, the quartile rankings may be helpful. The quartile scores divide the counties into fourths or quartiles with a quartile score of 0 indicating lowest risk and a quartile score of 3 indicating highest risk. For prevention planning purposes, it may be beneficial to divide the counties into quintiles or sextiles. Ultimately, it depends on the level of description that prevention planners find best facilitates the decision-making process.

Table 4: County-Level Risk Factor Scores and Quartile Ranks

	Overall		Community		Family		Peer/Individual	
County	Score	Quartile	Score	Quartile	Score	Quartile	Score	Quartile
Haywood	3.32	3	2.45	3	2.78	3	1.57	3
Madison	2.81	3	1.06	3	3.32	3	1.24	3
Dyer	2.46	3	1.78	3	1.63	3	1.86	3
Lauderdale	2.27	3	1.41	3	1.10	3	2.54	3
Henderson	2.02	3	-0.35	1	4.00	3	0.08	2
Shelby	1.80	3	2.40	3	0.15	2	1.39	3
Davidson	1.77	3	2.62	3	0.28	2	0.83	3
Benton	1.41	3	-0.45	1	3.14	3	-0.14	1
Hardeman	1.35	3	0.92	3	-0.11	2	2.43	3
Henry	1.31	3	0.61	2	1.75	3	0.15	2
Lake	1.29	3	1.97	3	1.16	3	-0.72	0
Gibson	1.25	3	1.19	3	0.67	3	0.79	3
Hamilton	1.17	3	1.12	3	0.88	3	0.39	2
Lewis	0.93	3	-0.44	1	-0.05	2	3.05	3
Cocke	0.92	3	1.12	3	0.93	3	-0.31	1
Weakley	0.78	3	0.22	2	0.77	3	0.71	3
Bedford	0.72	3	0.60	2	0.54	3	0.32	2
Dekalb	0.71	3	-0.33	1	1.00	3	0.85	3
Warren	0.60	3	0.14	2	0.89	3	0.16	2
Grundy	0.55	3	1.19	3	0.06	2	-0.32	1
Knox	0.53	3	0.49	2	0.91	3	-0.47	1
Marshall	0.52	3	0.85	3	0.49	3	-0.39	1
Montgomery	0.49	3	-0.19	1	0.64	3	0.50	3
Hamblen	0.49	3	0.84	3	0.35	2	-0.26	1
Chester	0.40	2	-0.57	1	-0.42	1	2.36	3
Fentress	0.34	2	0.08	2	-0.16	1	1.04	3
Clay	0.28	2	1.11	3	0.68	3	-1.53	0
Dickson	0.26	2	-0.18	1	0.59	3	0.00	2
Trousdale	0.24	2	0.37	2	0.18	2	-0.08	2
Obion	0.19	2	0.43	2	-0.72	0	0.95	3
White	0.17	2	-0.45	1	0.48	3	0.35	2
Maury	0.17	2	-0.10	1	-0.23	1	0.90	3
Franklin	0.17	2	-0.17	1	0.70	3	-0.36	1

County	Overall		Community		Family		Peer/Individual	
	Score	Quartile	Score	Quartile	Score	Quartile	Score	Quartile
McMinn	0.16	2	0.19	2	-0.15	1	0.40	2
Bradley	0.15	2	-0.07	1	0.13	2	0.08	2
Marion	0.15	2	-0.14	1	0.61	3	-0.26	1
Jackson	0.13	2	0.77	3	0.19	2	-0.86	0
Crockett	0.13	2	0.08	2	0.08	2	0.14	2
Van Buren	0.10	2	0.55	2	-0.14	2	-0.21	1
Hancock	0.10	2	1.47	3	-0.61	1	-0.70	0
Grainger	0.10	2	-0.79	0	-0.34	1	1.71	3
Coffee	0.08	2	0.67	3	-0.29	1	-0.19	1
Giles	0.05	2	0.35	2	-0.34	1	0.20	2
Anderson	0.00	2	0.84	3	-0.68	0	-0.06	2
Humphreys	-0.01	2	0.47	2	-0.08	2	-0.45	1
Lincoln	-0.01	2	1.00	3	-0.07	2	-1.15	0
Meigs	-0.05	2	-0.48	1	-0.06	2	0.59	3
Rhea	-0.08	2	-0.10	1	-0.29	1	0.30	2
Putnam	-0.10	1	-0.16	1	-0.02	2	-0.05	2
Claiborne	-0.11	1	-0.08	1	-1.07	0	1.35	3
Cannon	-0.16	1	-0.46	1	0.44	2	-0.47	1
Sullivan	-0.18	1	0.73	3	-0.46	1	-0.71	0
Cheatham	-0.20	1	-1.99	0	0.56	3	1.24	3
Campbell	-0.28	1	0.60	2	-0.54	1	-0.75	0
Sumner	-0.29	1	-1.05	0	-0.52	1	1.33	3
Robertson	-0.33	1	-1.31	0	-0.19	1	1.05	3
Hawkins	-0.38	1	-0.18	1	-0.86	0	0.46	3
McNairy	-0.39	1	0.16	2	-0.95	0	0.16	2
Carter	-0.40	1	0.55	2	-1.00	0	-0.27	1
Lawrence	-0.41	1	0.18	2	-0.77	0	-0.23	1
Tipton	-0.43	1	-0.73	0	-0.25	1	-0.30	1
Carroll	-0.45	1	-0.01	2	-1.03	0	0.35	2
Blount	-0.46	1	-0.98	0	0.28	2	-0.32	1
Johnson	-0.46	1	0.12	2	-0.89	0	-0.12	2
Wayne	-0.46	1	-0.14	1	-0.32	1	-0.54	1
Scott	-0.50	1	0.84	3	-0.51	1	-1.65	0
Union	-0.53	1	-0.77	0	-0.21	1	-0.08	2
Sevier	-0.54	1	-0.60	1	-0.70	0	0.37	2
Fayette	-0.55	1	-1.17	0	-0.92	0	1.28	3
Morgan	-0.56	1	-0.03	2	0.10	2	-1.53	0
Houston	-0.57	1	-0.23	1	0.06	2	-1.21	0
Overton	-0.61	1	0.02	2	-0.05	2	-1.50	0
Roane	-0.62	0	-0.01	2	-0.74	0	-0.53	1
Moore	-0.63	0	-0.38	1	-0.24	1	-0.86	0
Hardin	-0.64	0	0.61	3	-1.05	0	-0.93	0
Smith	-0.66	0	-1.48	0	0.29	2	-0.24	1
Washington	-0.74	0	0.63	3	-0.93	0	-1.36	0
Macon	-0.74	0	-0.87	0	-0.23	1	-0.52	1
Greene	-0.76	0	0.40	2	-0.70	0	-1.44	0

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County	Overall		Community		Family		Peer/Individual	
	Score	Quartile	Score	Quartile	Score	Quartile	Score	Quartile
Sequatchie	-0.79	0	-1.36	0	-0.24	1	-0.02	2
Monroe	-0.83	0	-0.64	1	-0.27	1	-0.97	0
Bledsoe	-0.85	0	-0.99	0	-0.09	2	-0.82	0
Wilson	-0.96	0	-1.87	0	-0.19	1	0.12	2
Unicoi	-1.00	0	0.04	2	-1.07	0	-1.11	0
Rutherford	-1.06	0	-1.31	0	-0.63	1	-0.22	1
Cumberland	-1.07	0	-1.39	0	0.17	2	-1.20	0
Polk	-1.07	0	-0.80	0	-0.67	1	-0.78	0
Stewart	-1.10	0	-1.44	0	0.37	2	-1.57	0
Decatur	-1.19	0	-0.15	1	-1.56	0	-0.66	1
Hickman	-1.22	0	-1.38	0	-1.10	0	0.15	2
Pickett	-1.48	0	-0.65	0	-1.83	0	-0.39	1
Loudon	-1.52	0	-1.54	0	-1.36	0	-0.09	2
Jefferson	-1.86	0	-1.49	0	-1.48	0	-0.87	0
Perry	-1.99	0	-0.65	0	-1.16	0	-2.67	0
Williamson	-2.56	0	-3.13	0	-1.80	0	-0.29	1

Regional risk-factor scores and quartile rankings for the 14 Tennessee Health Department Regions are presented in Table 5. The scores were computed as the arithmetic mean score of all the counties within a region. Thus, the metropolitan regions, which are single counties, have the same scores as in the previous table. However, the quartile rankings are based on the 14 regions and may be different from those in the previous table. For statewide planning it may helpful to consider relative-risk levels at both the county and regional levels. Geographic mappings of the regional and county-level quartiles for the Overall, Community, Family, and Peer/Individual risk-factors are presented in Figures 1 through 4, respectively.

Table 5: Regional-Level Risk Factor Scores and Quartile Ranks

Region	Overall		Community		Family		Peer/Individual	
	Score	Quartile	Score	Quartile	Score	Quartile	Score	Quartile
Madison	2.81	3	1.06	2	3.32	3	1.24	3
Shelby	1.80	3	2.40	3	0.15	2	1.39	3
Davidson	1.77	3	2.62	3	0.28	2	0.83	2
Hamilton	1.17	2	1.12	3	0.88	3	0.39	2
Northwest	0.93	2	0.65	2	0.83	2	0.45	2
Southwest	0.62	2	0.26	1	0.26	2	0.85	3
Knox	0.53	2	0.49	2	0.91	3	-0.47	0
Southeast	-0.17	1	-0.27	0	0.00	1	-0.12	1
Upper-Cumberland	-0.18	1	-0.22	0	0.12	1	-0.33	1
Sullivan	-0.18	1	0.73	2	-0.46	0	-0.71	0
South Central	-0.19	1	0.05	1	-0.30	1	-0.12	1
East	-0.42	0	-0.18	1	-0.42	0	-0.27	1
Mid-Cumberland	-0.51	0	-0.99	0	-0.09	1	0.03	2
Northeast	-0.52	0	0.43	1	-0.86	0	-0.65	0

**Tennessee Social Indicator Study
Overall Risk Factor**
(14 Regions)

**Tennessee Social Indicator Study
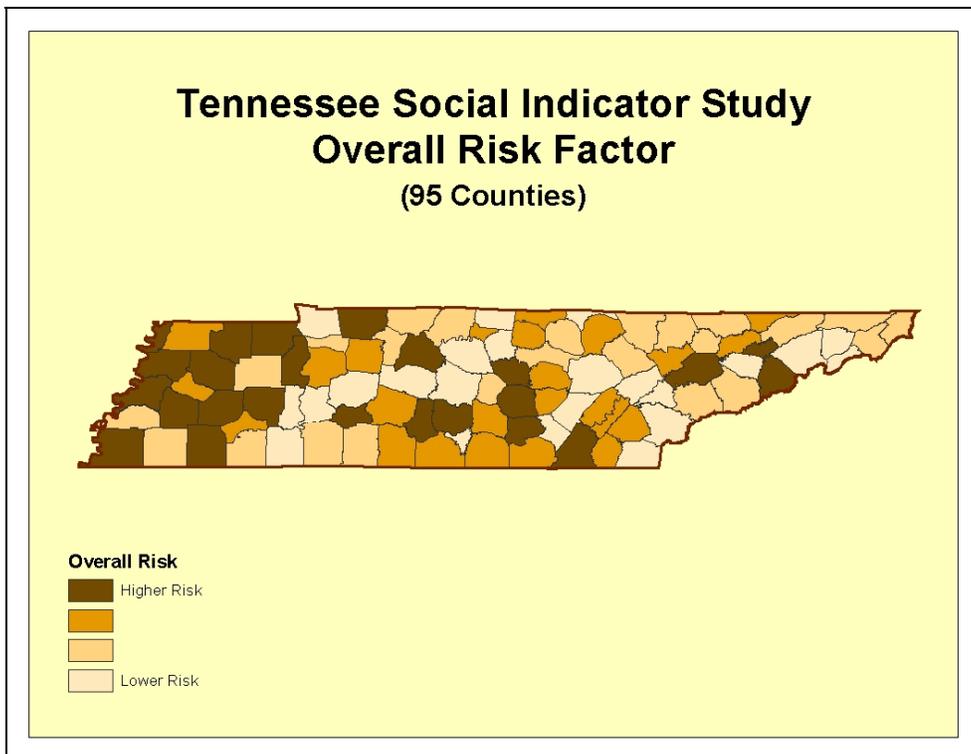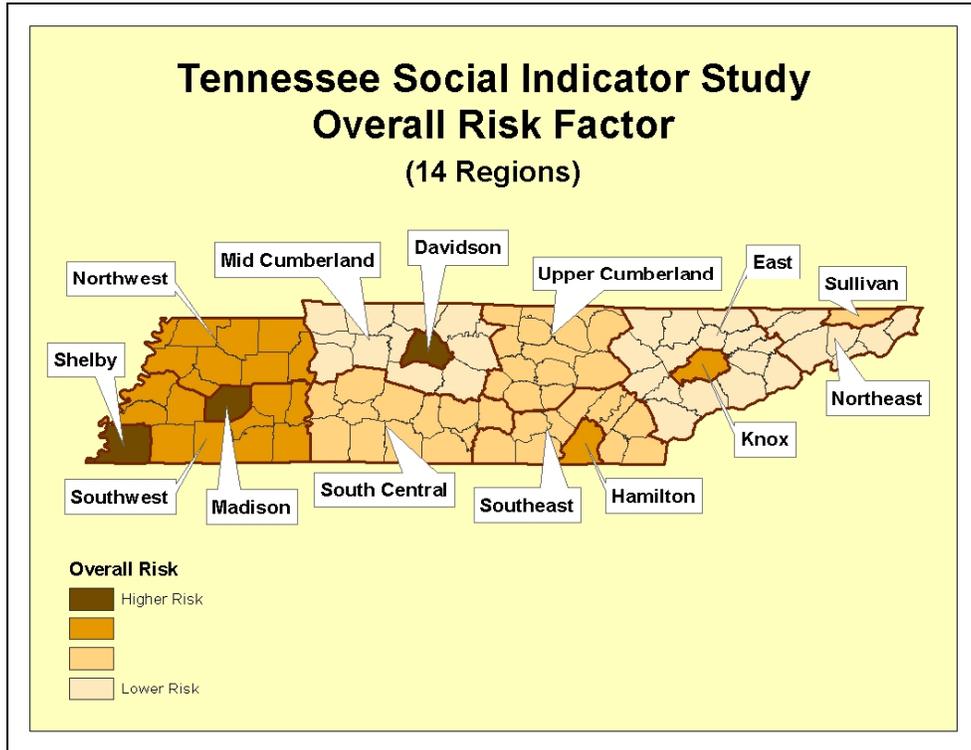Overall Risk Factor**
(95 Counties)

Figure 1 Overall risk levels: regional quartiles (upper panel) and county quartiles (lower panel).
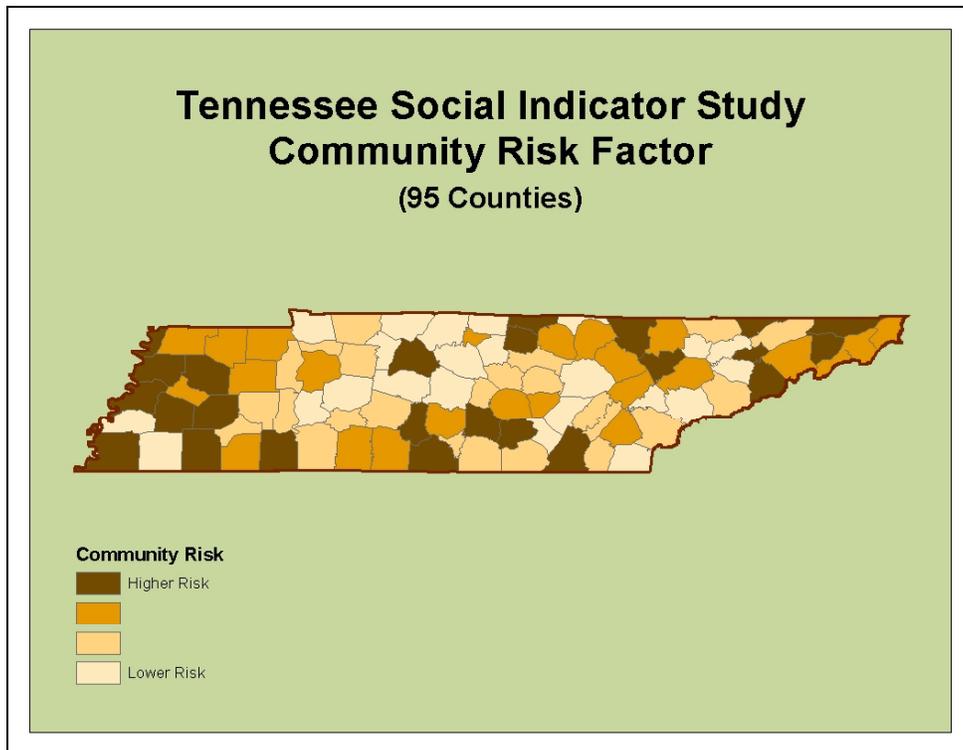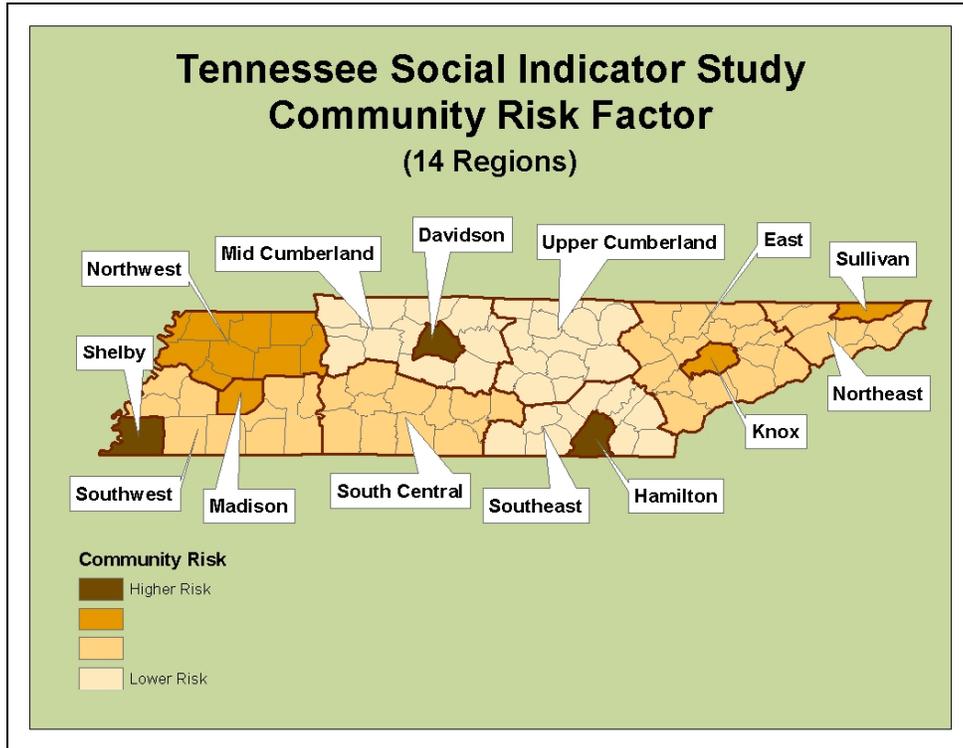
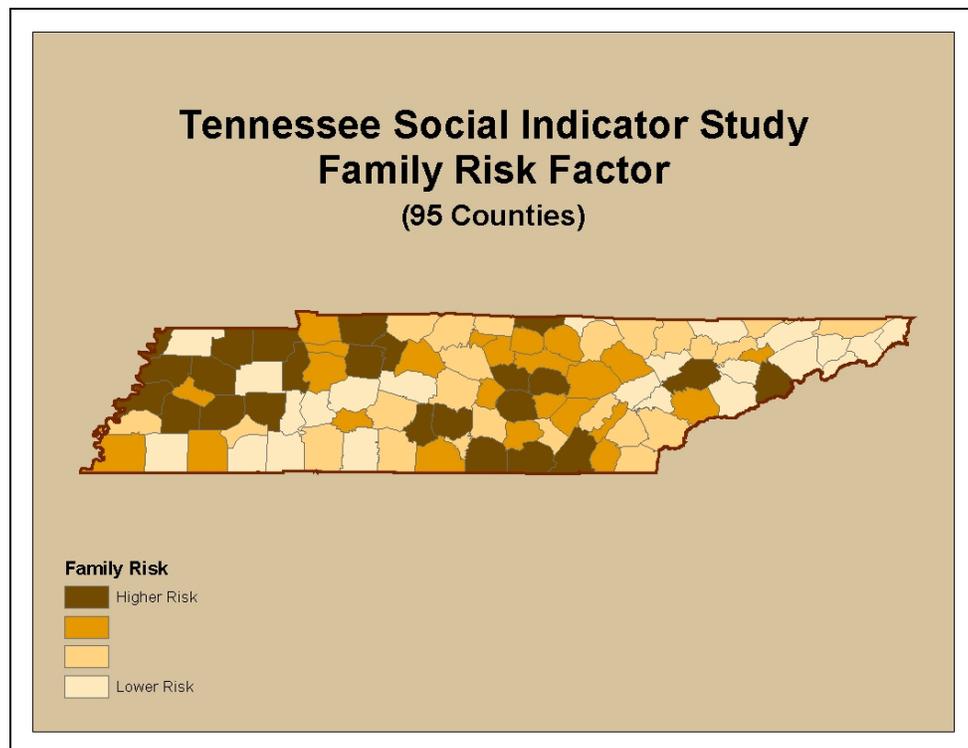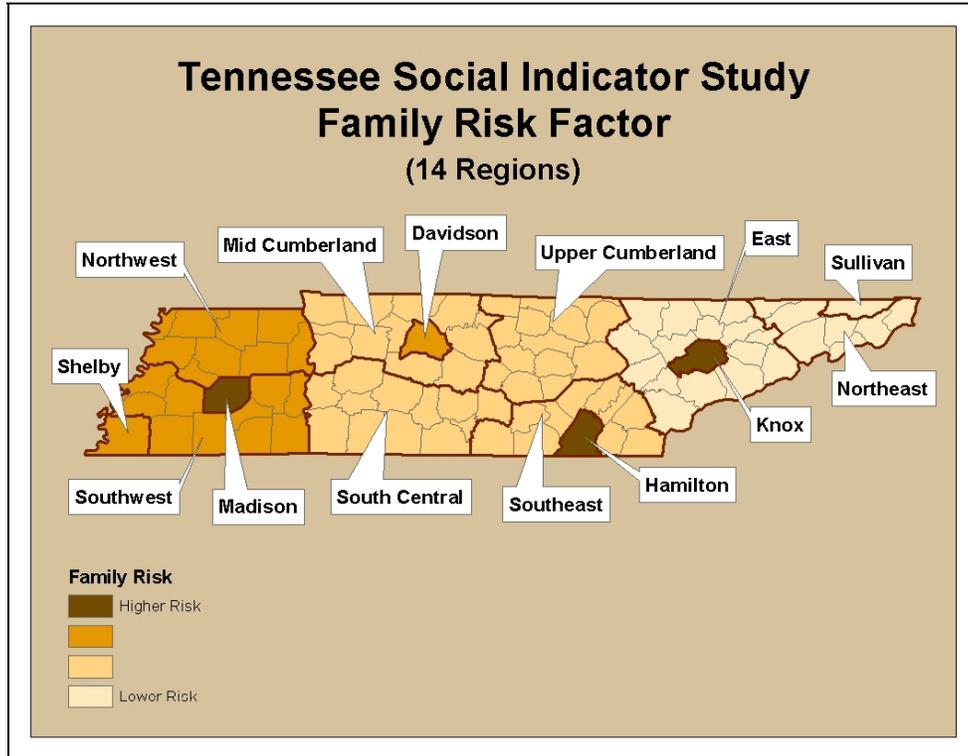**Figure 2 Community risk levels: regional quartiles (upper panel) and county quartiles (lower panel).**

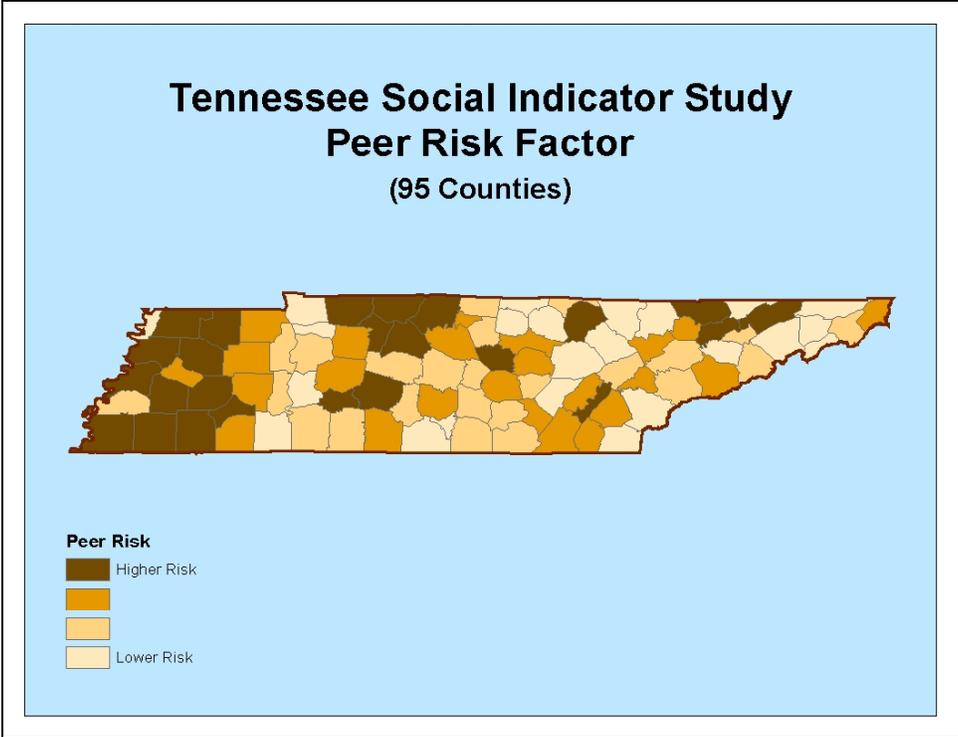**Figure 3 Family risk levels: regional quartiles (upper panel) and county quartiles (lower panel).**
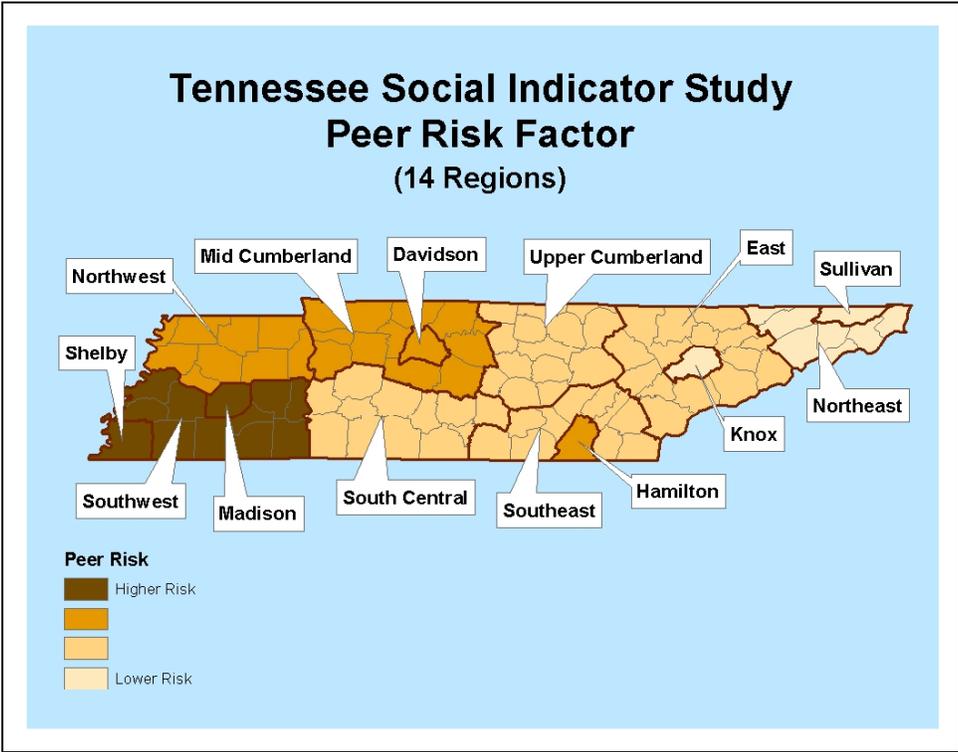
Figure 4 Peer risk levels: regional quartiles (upper panel) and county quartiles (lower panel).

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