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Community characteristics associated with child abuse in Iowa

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Abstract

Problem: Various demographic and community characteristics are associated with child abuse rates in national and urban samples, but similar analyses have not been done within rural areas. This study analyzes the relationships between reported and substantiated rates of child abuse and county demographic, health care resource and social services factors in a predominantly rural state in the US.

Methods: County-level data from Iowa between 1984–1993 were analyzed for associations between county characteristics and rates of child abuse using univariate correlations and multivariate stagewise regression analysis. Population-adjusted rates of reported and substantiated child abuse were correlated with rates of children in poverty, single-parent families, marriage and divorce, unemployment, high-school dropouts, median family income, elder abuse, birth and death rates, numbers of physicians and other healthcare providers, hospital, social workers, and number of caseworkers in the Department of Human Services.

Results: Rates of single-parent families, divorce and elder abuse were significantly associated with reported and substantiated child abuse in multivariate analysis, while economic and most health care factors were not. Reporting and substantiation rates differed across districts after adjustment for multiple factors including caseworker workload.

Conclusions: In this rural state, family structure is more significantly associated with child abuse report and substantiation rates than are socioeconomic factors. The level of health care resources in a county does not appear to affect these rates.

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Introduction

Child abuse and neglect affects hundreds of thousands of children each year. Nationwide, there were 861,602 cases of substantiated child abuse in 1998 (12.9 per 1,000 children), up 25% from 1990 (US Census Bureau, 2000). Iowa's child abuse victimization rate in 1998 was 10.1 per 1,000 children (US Census Bureau, 2000). That year, there were 19,412 investigated reports (US Census Bureau, 2000), of which 25% were substantiated (US Dept. of Health and Human Services, 2000). Neglect was the largest category of abuse (63%), followed by physical abuse (21%), sexual abuse (13%) and medical neglect (3%), again similar to the national distribution (US Census Bureau, 2000).

Child maltreatment in national samples has been linked to family income (Cappelleri, Eckenrode, & Powers, 1993; Jones & McCurdy, 1992; Sedlak & Broadhurst, 1996), unemployment (Gillham et al., 1998; Wolfner & Gelles, 1993), caregivers with blue-collar occupations (Wolfner & Gelles, 1993), alcohol or drug use (Wolfner & Gelles, 1993), larger families (Sedlak & Broadhurst, 1996; Wolfner & Gelles, 1993), single-parent families (Sedlak & Broadhurst, 1996), and victim age, gender (Cappelleri et al., 1993; Jones & McCurdy, 1992; Sedlak & Broadhurst, 1996) or ethnicity (Cappelleri et al., 1993). Within urban areas, Coulton found links between child and community characteristics such as impoverishment, child care burden (ratio of children to adults) and community-wide residential instability (Coulton, Korbin, & Su, 1999; Coulton, Korbin, Su, & Chow, 1995). Garbarino found that 79% of the variance in child maltreatment rates between neighborhoods in Chicago was accounted for by nine variables: the rates of poverty, unemployment, female-headed households, overcrowded housing, African American ethnicity, Hispanic ethnicity, affluence, educational attainment, and residency less than 5 years (Garbarino & Kostelny, 1992). Whether these characteristics principally affect child maltreatment incidence rates or merely reporting rates remains unclear (Coulton et al., 1999; Garbarino & Crouter, 1978a). These variables also appear as risk factors for child maltreatment on the individual level (Black, Heyman, & Slep, 2001).

Most studies find few differences in child maltreatment incidence rates between urban and rural areas, (Cappelleri et al., 1993; Sedlak & Broadhurst, 1996; Wolfner & Gelles, 1993) although one study found relatively higher rates of reported physical and sexual abuse in the rural tracts of Montgomery County, Maryland (Ernst, 2000). Within rural areas, little is known about the relationships between community risk factors and child maltreatment incidence rates. Community-level risk factors for child maltreatment may be different in rural vs. urban areas because of differences in community structure and resources, neighborhood relationships, and access to health care. Defining these risk factors is a prerequisite to developing prevention efforts targeted at rural areas. The purpose of this study is to describe the relationship between community factors and rates of reported and substantiated child abuse in the predominantly rural state of Iowa. Since access to care can be difficult in rural areas, and since health care encounters represent opportunities for identifying and reporting suspected child maltreatment, we hypothesized that the presence of health care resources and personnel in the community is associated with an increased rate of child abuse reports and perhaps also an increased rate of substantiated reports.

Methods

Iowa is defined as a rural state (with 45% or less of the population residing in urban portions of metro areas in 1993) and the economy is farming-dependent (with 4% or more of total labor and proprietor income derived from farming in 1991–1993) (RCAT, 1996). The mean population density in Iowa is 49 per square mile, with a range of 10 (Ringgold County) to 575 (Polk County). Only 9 counties out of 99 in Iowa have population densities greater than 100 per square mile. Polk County, which contains the capital Des Moines, has the largest population at 483,924. For comparison, Cook County, Illinois (Chicago) has a population of 5,376,741 with a population density of 5,686 per square mile, and St. Louis County, Missouri has a population of 1,016,315 with a population density of 2,001 per square mile (US Census Bureau, 2001).

The number of child abuse reports and substantiated cases per county per year were obtained through the Iowa Department of Human Services (DHS), Division of Data Management, Bureau of Research and Statistics. These data were accessible to the public and contained no patient identifiers. The study was approved by the University of Iowa Institutional Review Board as exempt from federal regulations on that basis. Data from January 1984 through December 1993 were used in this analysis. Ten-year incidence rates were calculated by taking the number of county level reports and substantiated cases for the years 1984 through 1993 and dividing by the county population under 18 years of age. Reports are new allegations of abuse and more than one report may be filed on the same child. Chapter 232.68 of the Iowa Code defines child abuse as abuse of a child under age 18 by a caretaker, which excludes acts committed by non-caretakers. An exception is sexual abuse, which is defined as committed by a caretaker or non-caretaker (Iowa Code, 1999a). Child abuse includes physical, mental and sexual abuse, neglect, child prostitution and allowing a child to ingest an illegal drug (Iowa Code, 1999a). Reports are received from mandatory reporters, who include physicians, social workers, licensed school employees, department of human services employees, peace officers, psychologists and mental health professionals, dental hygienists, and employees or operators of health care facilities, substance abuse facilities, mental health centers, child care centers, day care homes, juvenile detention or shelter facilities and foster care facilities. Any other person who suspects a child has suffered abuse may report as well (Iowa Code, 1999b). If the DHS caseworker determines that abuse did occur as defined by the Iowa Code, the case is substantiated and entered into a registry (Iowa Code, 1999c).

We chose potential predictor variables based on factors found to be important in previous community-level research or a previous study of elder abuse rates in Iowa (Jogerst, Dawson, Hartz, Ely, & Schweitzer, 2000), and added other factors we thought might be relevant, such as county healthcare resources and caseworker load. We were unable to obtain individual-level data such as age and gender of perpetrators or victims. Demographic data by county were obtained through the 1990 Census of Population and Housing, Bureau of the Census, and Department of Commerce. Data on live births (fetal, neonatal, perinatal, and infant), deaths, marriages and dissolutions were collected from the Iowa Department of Public Health. Other data on healthcare providers, facilities, and characteristics of households and families were obtained from the Iowa Department of Public Health, the Office of Statewide Clinical Education Programs at the University of Iowa, the American Hospital Association annual survey of

hospitals, the Iowa Department of Inspections and Appeals, the Physician Assistant Program at the University of Iowa, and the University of Iowa Health of the Public Program (Merchant, Rohrer, Urdaneta, & Walkner, 1994).

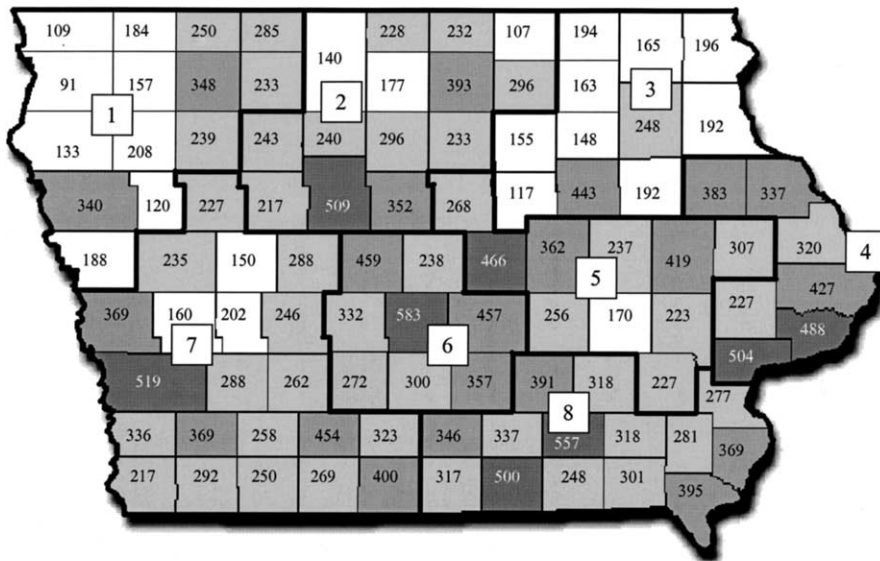
Through June 1992, Iowa was divided into eight DHS administrative districts. The number of full-time DHS caseworkers was not available by county because they were assigned to a district comprising 7 to 21 counties. The number of full-time equivalents (FTEs) per 10,000 population was calculated using 1990 caseworker numbers. There was very little change in the number of caseworkers over the study period.

For our analysis, reported and substantiated child abuse rates were transformed using the square root function in order to improve normality. We calculated Pearson correlation estimates between these transformed rates and each potential risk factor. Because some risk factors had skewed distributions, we confirmed outlying results using Spearman rank-based correlations, performing outlier diagnostics when the Pearson and Spearman results differed. When examining the predictive effects of multiple risk factors simultaneously, we performed stage-wise multiple linear regressions on the transformed child abuse rates. The analysis is termed stagewise because variables were entered into the model by groups, with stepwise regression selecting the most predictive variables within each group. First we performed a forward stepwise regression to find the most predictive demographic variables (first stage). After adjusting for these variables, we performed a forward stepwise regression using the health care factors as predictor variables (second stage). After adjusting for demographic and health care factors, we searched for significant social services factors (third stage). We examined the residuals of these regression models to confirm that the assumption of normality was valid.

Results

Between 1984 and 1993, the total statewide 10-year incidence of child abuse reports was 363 per 1,000 children under age 18, and 27% of these (98 per 1,000 children under age 18) were substantiated cases. Figure 1 shows the rates of reported cases and Figure 2 shows the rates of substantiated cases of child abuse by county and by district. Reported and substantiated child abuse rates differed significantly by district ($p < .0001$). The number of cases reported per county over the 10 years ranged from 91 to 583 per 1,000 children under age 18. The number of substantiated cases per county ranged from 24 to 157 per 1,000. Substantiated percentages ranged from 14.2% to 37.6% in the 99 counties and from 23.4% to 32.0% in the eight districts.

Table 1 shows the univariate analysis of risk factors for child abuse reports and substantiated cases. Risk factors include demographic, health care and social services factors. Examination of the data revealed that marriage rates and number of chiropractors were significantly skewed. Both marriage rate and chiropractors were not significantly associated with report or substantiation rates in the initial analysis. Removing Chickasaw county, which had an unusually high marriage rate, led to a positive association between marriage rate and reported ($R = .408$, $p < .001$) and substantiated ($R = .422$, $p < .001$) abuse. Similarly, chiropractors were highly concentrated near a chiropractic school in Scott county. Univariate analysis after excluding this county yielded a negative association between number of chiropractors and reported ($R = -.230$, $p = .023$) and substantiated ($R = -.197$, $p = .052$) abuse.



Number of counties in each interval	Interval	Rate range
24	Lowest	91 to 208
46	2 nd	217 to 337
21	3 rd	337 to 459
8	Highest	466 to 583

Mean rates by district		District number	
1	239	5	337
2	309	6	479
3	287	7	342
4	423	8	381

Figure 1. Ten-year rate of reported child abuse (per thousand <18 years old).

Tables 2 and 3 show the multivariate (stagewise) analysis of risk factors for child abuse reports and substantiated cases. Seventy-two percent of the variance for reported and 58% of the variance for substantiated child abuse was accounted for by demographic factors. Social services factors explained 10% of the variance for reported and 8% of the variance for substantiated child abuse. Factors associated with both reported and substantiated cases of child abuse were the percent of singles with children under 18, the divorce rate, and reported elder abuse. Larger mean family size and the number of chiropractors were associated with fewer

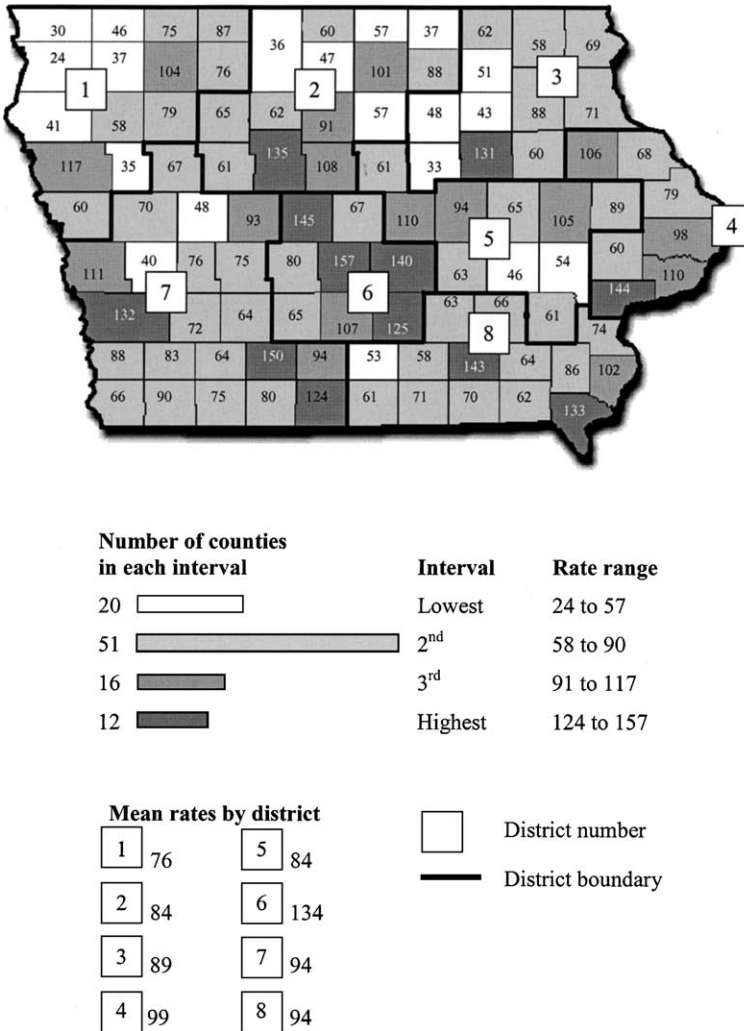


Figure 2. Ten-year rate of substantiated child abuse (per thousand <18 years old).

reports, while the number of chiropractors and DHS case workers were associated with fewer substantiated cases. There was a district effect on the rate of reported, but not substantiated, child abuse. Repeating the analysis without Chickasaw or Scott counties did not change the results of the multivariate analysis.

The choice to enter health care factors into the stepwise regression before social services factors was an arbitrary one. Repeating the stepwise regression with social services factors entered before health care factors yielded continued strong associations between reported child and elder abuse ($t = 6.80, p < .001$) and between substantiated child and elder abuse ($t = 4.99, p < .001$). Chiropractors and district were no longer significantly associated with reported or substantiated abuse rates, and internists were now associated with fewer reported child abuse cases ($t = -2.00, p = .048$).

Table 1
Univariate Pearson correlations of county characteristics with reported and substantiated child abuse

Variable	Reported child abuse	Substantiated child abuse
Demographic factors		
County population	.433 [‡]	.409 [‡]
Population density	.442 [‡]	.410 [‡]
Persons under 18 years of age	-.242 [†]	-.175
Persons 65 or older	-.275 [†]	-.293
Unemployment rate	.329 [‡]	.269 [†]
Median family income	.182*	.241 [†]
Children <6 in poverty	.281 [†]	.213 [†]
Marriage rate ^a	-.011	.006
Marriage dissolution rate	.709 [‡]	.637 [‡]
Percent families with children under 18	-.041	.018
Percent married couples with children under 18	-.447 [‡]	-.356 [‡]
Percent singles with children under 18	.791 [‡]	.729 [‡]
Mean family size	-.282 [†]	.207 [†]
Persons living alone	.126	.047
Persons in pre-1950 housing	-.303 [†]	-.288 [†]
High-school dropouts	-.128	-.165
Live birth rate	.197*	.175*
Teen birth rate	.536 [‡]	.402 [‡]
Low birthweight birth rate	.272 [†]	.239 [†]
Death rate	-.056	-.086
Infant death rate	.079	-.018
Neonatal death rate	.031	-.037
Perinatal death rate	.107	.069
Health care factors		
Nonfederal hospitals	.207 [†]	.189*
Hospital beds	.143	.101
Primary care physicians (internists, pediatricians, and family physicians)	.267 [†]	.304 [†]
Family practice physicians	-.067	.032
General internists	.380 [‡]	.341 [‡]
Obstetrician/gynecologists	.394 [‡]	.338 [‡]
Pediatricians	.313 [†]	.246 [†]
Physician assistants	-.150	-.117
General surgeons	.121	.171*
Registered nurses	.075	.112
Nurse practitioners	-.027	-.073
LPNs	-.092	-.148
Chiropractors ^a	-.081	-.093

Table 1 (Continued)

Variable	Reported child abuse	Substantiated child abuse
Social services factors		
Ratio of substantiated/reported child abuse	-.265 [†]	.209 [†]
Reported elder abuse	.708 [‡]	.569 [‡]
Substantiated elder abuse	.649 [‡]	.624 [‡]
Ratio of substantiated/reported elder abuse	.202 [†]	.288 [†]
Case workers/10,000 population	.427 [‡]	.237 [†]
Social workers	.263 [†]	.318 [†]

Substantiated and reported rates were transformed to square roots.

^a Variable affected by skewed distribution—see text.

* $p < .10$.

[†] $p < .05$.

[‡] $p < .001$.

Because DHS caseworkers are assigned at the district level, and because the number of child abuse reports is a measure of their case workload, we performed additional analyses to examine the relationship between caseworker FTEs, district and reported child abuse rates. Compared to caseworker FTEs, the district was more closely correlated with reported abuse in the multivariate analysis, and forcing caseworker FTEs into the model first did not completely eliminate the significance of the district ($p = .059$). We then examined predictors of the ratio of substantiated to reported abuse (the substantiated percentage) in multivariate

Table 2

Multivariate stagewise^a regression analysis of risk factors associated with rates of reported child abuse^b

Factor	Regression coefficient	<i>t</i> value	<i>p</i> value
Demographic factors ($R^2 = .72$)			
Percent singles with children under 18	.048	8.68	<.001
Mean family size	-.227	-3.38	.001
Marriage dissolution rate	.021	2.78	0.006
Health care factors ($R^2 = .75$)			
Chiropractors	-.009	-2.82	.006
Social services factors ($R^2 = .85$)			
Reported elder abuse	.840	5.34	<.001
District effect	- ^c	(2.52) ^c	.021

^a Health care factors are evaluated only after the significant demographic factors are forced into the model, and the social services factors are evaluated only after the significant demographic and health care factors are forced into the model.

^b The outcome variable is the square root of the rate of reported child abuse. When the square root transformation is used, the distributions of the residuals from the regression analysis do not significantly differ from normal distribution.

^c There is no regression coefficient because this variable is for the effect of eight districts. The *F* statistic for this effect is given in parentheses.

Table 3

Multivariate stagewise^a regression analysis of risk factors associated with rates of substantiated child abuse^b

Factor	Regression coefficient	<i>t</i> value	<i>p</i> value
Demographic factors ($R^2 = .58$)			
Percent singles with children under 18	.021	6.23	<.001
Marriage dissolution rate	.014	3.21	.002
Health care factors ($R^2 = .61$)			
Chiropractors	-.005	-2.64	.010
Social services factors ($R^2 = .69$)			
Substantiated elder abuse	.733	4.64	<.001
Case workers/10,000 population	-.043	-2.20	.030

^aHealth care factors are evaluated only after the significant demographic factors are forced into the model, and the social services factors are evaluated only after the significant demographic and health care factors are forced into the model.

^bThe outcome variable is the square root of the rate of substantiated child abuse. When the square root transformation is used, the distributions of the residuals from the regression analysis do not significantly differ from normal distribution.

analysis. We found that the district was slightly more significant than caseworker FTEs in univariate analysis (both $p < .0001$), and thus district was chosen in the stepwise regression ($F = 6.72$, $p < .001$). After forcing caseworker FTEs into the model, district remained significantly associated with the substantiated percentage ($p = .0005$). In a stepwise regression that included social services factors before health care factors, district was strongly associated with the substantiated percentage ($F = 6.72$, $p < .001$); caseworker FTEs did not enter this model. Therefore, caseworker FTEs do not fully explain the differences in reporting rates and explain even less of the differences in substantiated percentages among districts.

Discussion

Demographic factors

In multivariate analysis, we found that a surprisingly large proportion of the variance in child abuse reporting and substantiation rates was accounted for by only two demographic factors: single-parent families and divorce rates. The teen birth rate was significantly associated with higher reported and substantiated rates in univariate but not multivariate analysis, probably because it covaries with single-parent families. Family size was negatively associated with reported abuse rates, which probably reflects the prevalence of larger households among intact rural families. Child poverty, unemployment, population density and median family income were significantly associated with child abuse report or substantiation rates only in univariate analysis. This discrepancy between univariate and multivariate analyses suggests that socioeconomic issues may be less related to child abuse than family structure and support (or lack of support).

Previous county-level data from New York state did not include the rate of single-parent families, but found that the rate of working mothers (possibly a proxy for female-headed households in 1976) yielded an R of .42 (Garbarino, 1976). Interestingly, Garbarino found that

within Chicago neighborhoods, the rate of female-headed households was positively associated with child abuse rates in Hispanic neighborhoods (as we also found) but negatively associated with abuse rates in African American neighborhoods (Garbarino & Kostelny, 1992).

Two considerations may explain the importance of family structure. First, these results may reflect underreporting of child abuse in intact families. However, individual-level data reveals that marital status is not significantly associated with either physical abuse or neglect, while parental depression and substance abuse are strongly associated with both (Chaffin, Kelleher, & Hollenberg, 1996). We hypothesize that the parental psychiatric and substance abuse disorders manifest on the community level as marital instability, which in turn reduces the socioeconomic status of the family.

In a previous analysis of elder abuse in Iowa, population density and child poverty were associated with higher rates of reported and substantiated elder abuse (Jogerst et al., 2000) but this analysis did not include rates of single-parent families and divorce. National studies of child abuse do not always include information on the marital or partnered status of caretakers or perpetrators (US Dept. of Health and Human Services, 2000) and often find correlations with economic indicators such as unemployment and income, which covary with single parenthood. Community-level studies that do not include variables related to family structure are incomplete, and may attribute an unwarranted importance to purely economic factors.

In fact, we did not find a consistent univariate relationship between economic indicators and child abuse rates, which has been proposed as an indicator of reporting adequacy, based on studies from urban and mixed urban/rural areas (Garbarino & Crouter, 1978b). We found that child poverty was significantly associated with both reported and substantiated abuse. However, family income was *positively* associated with reported and substantiated abuse rates, rather than negatively associated, as would be expected (Garbarino & Crouter, 1978b). We do not have major concerns about reporting adequacy in Iowa during the years included in this analysis. We hypothesize that the univariate relationship between family income and abuse rates is different in rural areas because of the low income that farming communities derive from agricultural work.

Health care factors

The most notable result regarding health care factors is the lack of any association between medical physicians and child abuse reporting or substantiation rates. This is consistent with the fact that physicians and other health care providers account for only 7.9% of child abuse reports (US Dept. of Health and Human Services, 2000).

The number of chiropractors in a community was associated with lower rates of reported and substantiated child abuse, after adjustment for multiple demographic and economic factors. In the analysis of elder abuse, chiropractors were associated with lower rates of substantiated elder abuse, but not reported elder abuse (Jogerst et al., 2000). The reason for the association between chiropractors and lower rates of abuse is unclear, and may be an artifact of the variables chosen for this analysis, or the anomalous fact that in 1993 Iowa had the fourth largest concentration of chiropractors in the United States (Cherkin & Mootz, 1998). Other possibilities are that chiropractic care may function as a stress-relieving mechanism for adults in the community (Tuchin, Pollard, & Bonello, 2000), or that chiropractors may be caring for injured abused children without reporting or recognizing the abuse. In a national sample, 16% of chiropractic

users were under 18 years of age (Shekelle & Brook, 1991), and chiropractors offer treatment for childhood problems such as asthma (Balon et al., 1998) and infantile colic (Olafsdottir, Forshei, Fluge, & Markestad, 2001). To our knowledge, an association between chiropractors and higher or lower child abuse report rates has not previously been published.

Social services factors

Rates of child abuse and elder abuse (both reported and substantiated) are strongly associated with each other, although the child abuse rates are an order of magnitude greater than the elder abuse rates. The 10-year incidence of elder abuse reports between 1984 and 1993 was 12.7 per 1,000 people age 65 and older (Jogerst et al., 2000). Of these, 26.5% were substantiated (Jogerst et al., 2000). In Iowa, both child and elder abuse are handled by the same caseworkers, which may strengthen the association, but these results also suggest that the same societal stresses that contribute to child abuse also contribute to elder abuse. Other possible interpretations are that communities disposed to report child abuse are also more likely to report elder abuse, that adults who abuse children are more likely to also abuse elders, or that caretakers who cannot protect their children also cannot protect their elders.

The district effect remains unexplained. Rates of reported and substantiated child abuse varied about twofold between districts. Spatial and temporal clustering of child abuse reporting and substantiation rates within counties and within periods of less than 60 days have been documented (Fryer & Miyoshi, 1995), implying that publicity about abuse cases can precipitate additional reports. However, it is unlikely that this would significantly affect multi-county reporting rates averaged over 10 years. While for elder abuse there was a district effect on both the reported and substantiated rates (Jogerst et al., 2000), for child abuse there was a district effect only for reported rates. In view of the much higher rates of reported child abuse compared to elder abuse, a worrisome interpretation is that higher child abuse report rates increase the caseload beyond the capacity of caseworkers to investigate the additional reports, leaving the substantiated rates relatively unchanged. Any future efforts to improve reporting rates must be accompanied by sufficient resources to accommodate the increased caseloads. This is especially important in view of evidence that past negative experiences with child protective services and perceived lack of benefit to the child can dissuade professionals from reporting subsequent cases of suspected abuse (Flaherty, Sege, Binns, Mattson, & Christoffel, 2000).

Implications

Community-wide prevention efforts are potentially more effective than individual-level interventions. In order to target community-wide prevention efforts, the community-level risk factors for child maltreatment must first be defined. Multiple demographic variables were associated with child abuse report and substantiation rates in univariate analysis. However, the multivariate model yielded only two independently predictive variables: single-parent families and divorce rates. Together, these two variables accounted for the majority of the variance in both report and substantiation rates.

Parental depression and substance abuse are risk factors for committing physical abuse and neglect (Chaffin et al., 1996), and may contribute to the community-level rates of divorce and

single-parent families, which in turn is associated with higher rates of child abuse reports and substantiations. The medical system could possibly contribute to the *prevention* of child abuse, by detecting and treating depression and substance abuse in adults who care for children. However, in our analysis the presence of hospitals and physicians did not affect child abuse reporting and substantiation rates. An important question is whether improved detection and treatment of substance abuse and depression among caretakers will reduce the risk of child abuse and neglect in affected families.

Our results suggest that the health care system is currently not a good detector of child abuse, since health care factors were not associated with increased reporting rates in our analysis. In Iowa, child abuse is more often reported by parents, relatives, neighbors and other community members (30.8%), and less often by medical professionals (7.9%) (US Dept. of Health and Human Services, 2000). Because family and community members have more opportunities to observe a child repeatedly over time, community intervention may be the most effective way to increase the number of reports and ultimately substantiated cases. Further investigation is warranted to define effective strategies for increasing child abuse detection.

Limitations

This is an ecologic study using the county as the unit of analysis, and inferences from county-wide associations to causal relationships at the family or individual level may be invalid due to ecologic bias (Bertolli, Morgenstern, & Sorenson, 1995). Nevertheless, this type of information is needed in order to construct an ecological understanding of child abuse, in which abuse is viewed as the result of complex interactions between risk factors at the individual, family, and community levels (Kaplan, Pelcovitz, & Labruna, 1999). Further research using geographic information systems and spatial analysis on a neighborhood level may be helpful to bridge the conceptual gap between county and family.

Another important limitation is that the current study does not address true prevalence, but only reported and substantiated cases. We could not assess the extent of underreporting. We were unable to analyze according to different types of abuse. The rates of reported and substantiated child maltreatment include all types of abuse described in the Iowa definition of child abuse even though they may differ in important ways. Physical and sexual abuse are to some extent perpetrated by different demographic groups on different groups of children (US Dept. of Health and Human Services, 2000; Jones & McCurdy, 1992) and poverty is more strongly associated with neglect than with physical or sexual abuse (Drake & Pandey, 1996). The generalizability of our results to different states will be limited by differences in the definition of abuse, as well as economic and cultural differences. In addition, we were unable to include other potentially relevant community factors, such as rates of adult substance abuse and depression (Chaffin et al., 1996). Finally, we must note that association does not prove causation, and the associations we uncovered must be interpreted accordingly.

Conclusion

We found that in Iowa, rates of single-parent families, divorce and elder abuse were significantly associated with reported and substantiated child abuse rates, while most economic and

health care system factors were not associated with reported or substantiated abuse rates in multivariate analysis. We found marked differences in reported abuse among districts, but rates of substantiated abuse did not differ significantly after adjustment for multiple confounding variables. Further research should focus on the reasons for this discrepancy between reported and substantiated abuse among districts, and explore how communities most effectively contribute to the prevention and identification of child abuse and neglect. Additional analysis on finer geographic levels would also increase our understanding of the relationships between community characteristics and rates of child maltreatment, and how these relationships differ between rural and urban populations.

References

- Balon, J., Aker, P. D., Crowther, E. R., Danielson, C., Cox, P. G., O'Shaughnessy, D., Walker, C., Goldsmith, C. H., Duku, E., & Sears, M. R. (1998). A comparison of active and simulated chiropractic manipulation as adjunctive treatment for childhood asthma. *New England Journal of Medicine*, *339*(15), 1013–1020.
- Bertolli, J., Morgenstern, H., & Sorenson, S. B. (1995). Estimating the occurrence of child maltreatment and risk-factor effects: Benefits of a mixed-design strategy in epidemiologic research. *Child Abuse & Neglect*, *19*(8), 1007–1016.
- Black, D. A., Heyman, R. E., & Slep, A. M. S. (2001). Risk factors for child physical abuse. *Aggression & Violent Behavior*, *6*(2–3), 121–188.
- Cappelleri, J. C., Eckenrode, J., & Powers, J. L. (1993). The epidemiology of child abuse: Findings from the second national incidence and prevalence study of child abuse and neglect. *American Journal of Public Health*, *83*(11), 1622–1624.
- Chaffin, M., Kelleher, K., & Hollenberg, J. (1996). Onset of physical abuse and neglect: Psychiatric, substance abuse, and social risk factors from prospective community data. *Child Abuse & Neglect*, *20*(3), 191–203.
- Cherkin, D., & Mootz, R. (1998). *Chiropractic in the United States: Training, practice, and research* (AHCPR Publication 98-N002). Rockville, MD: Agency for Health Care Policy and Research, US Dept. of Health and Human Services.
- Coulton, C. J., Korbin, J. E., & Su, M. (1999). Neighborhoods and child maltreatment: A multi-level study. *Child Abuse & Neglect*, *23*(11), 1019–1040.
- Coulton, C. J., Korbin, J. E., Su, M., & Chow, J. (1995). Community level factors and child maltreatment rates. *Child Development*, *66*(5), 1262–1276.
- Drake, B., & Pandey, S. (1996). Understanding the relationship between neighborhood poverty and specific types of child maltreatment. *Child Abuse & Neglect*, *20*(11), 1003–1018.
- Ernst, J. S. (2000). Mapping child maltreatment: Looking at neighborhoods in a suburban county. *Child Welfare*, *79*(5), 555–572.
- Federal Programs Issue. (1996). Rural conditions and trends, *7*(2).
- Flaherty, E. G., Sege, R., Binns, H. J., Mattson, C. L., & Christoffel, K. K. (2000). Health care providers' experience reporting child abuse in the primary care setting. Pediatric practice research group. *Archives of Pediatrics and Adolescent Medicine*, *154*(5), 489–493.
- Fryer, G. J., & Miyoshi, T. (1995). A cluster analysis of detected and substantiated child maltreatment incidents in rural Colorado. *Child Abuse & Neglect*, *19*(3), 363–369.
- Garbarino, J. (1976). A preliminary study of some ecological correlates of child abuse: The impact of socioeconomic stress on mothers. *Child Development*, *47*(1), 178–185.
- Garbarino, J., & Crouter, A. (1978a). Defining the community context for parent-child relations: The correlates of child maltreatment. *Child Development*, *49*(3), 604–616.
- Garbarino, J., & Crouter, A. (1978b). A note on the problem of construct validity in assessing the usefulness of child maltreatment report data. *American Journal of Public Health*, *68*(6), 598–600.

- Garbarino, J., & Kostelny, K. (1992). Child maltreatment as a community problem. *Child Abuse & Neglect*, 16(4), 455–464.
- Gillham, B., Tanner, G., Cheyne, B., Freeman, I., Rooney, M., & Lambie, A. (1998). Unemployment rates, single parent density, and indices of child poverty: Their relationship to different categories of child abuse and neglect. *Child Abuse & Neglect*, 22(2), 79–90.
- Iowa Code. (1999a). Chap. 232.68.
- Iowa Code. (1999b). Chap. 232.69.
- Iowa Code. (1999c). Chap. 232.71D.
- Jogerst, G., Dawson, J., Hartz, A., Ely, J., & Schweitzer, L. (2000). Community characteristics associated with elder abuse. *Journal of the American Geriatrics Society*, 48, 513–518.
- Jones, E. D., & McCurdy, K. (1992). The links between types of maltreatment and demographic characteristics of children. *Child Abuse & Neglect*, 16(2), 201–215.
- Kaplan, S., Pelcovitz, D., & Labruna, V. (1999). Child and adolescent abuse and neglect research: A review of the past 10 years. Part I: Physical and emotional abuse and neglect. *Journal of the American Academy of Child and Adolescent Psychiatry*, 38(10), 1214–1222.
- Merchant, J., Rohrer, J., Urdaneta, M., & Walkner, L. (1994). *Provisions of comprehensive health care to rural Iowans in the 21st century*. Iowa City, IA: University of Iowa.
- Olafsdottir, E., Forshei, S., Fluge, G., & Markestad, T. (2001). Randomised controlled trial of infantile colic treated with chiropractic spinal manipulation. *Archives of Disease in Childhood*, 84(2), 138–141.
- Sedlak, A. J., & Broadhurst, D. D. (1996). *Executive summary of the Third National Incidence Study of Child Abuse and Neglect*. US Department of Health and Human Services.
- Shekelle, P. G., & Brook, R. H. (1991). A community-based study of the use of chiropractic services. *American Journal of Public Health*, 81(4), 439–442.
- Tuchin, P. J., Pollard, H., & Bonello, R. (2000). A randomized controlled trial of chiropractic spinal manipulative therapy for migraine. *Journal of Manipulative & Physiological Therapeutics*, 23(2), 91–95.
- US Census Bureau. (2000). *Statistical Abstract of the United States: 2000* (20th ed.). Washington, DC.
- US Census Bureau. (2001). *Profiles of general demographic characteristics, 2000*. Washington, DC: US Census Bureau.
- US Dept. of Health and Human Services. (2000). *Child maltreatment 1998. Reports from the states to the National Child Abuse and Neglect Data System*. Washington, DC: Administration on Children, Youth and Families, US Dept. of Health and Human Services.
- Wolfner, G., & Gelles, R. (1993). A profile of violence toward children: A national study. *Child Abuse & Neglect*, 17(2), 197–212.

Résumé

Objectif: On trouve des caractéristiques démographiques et communautaires variées associées aux taux de mauvais traitements envers les enfants dans les échantillons nationaux et par villes, mais on n'a pas fait de semblables analyses en milieu rural. Cette étude analyse les relations entre les taux de mauvais traitements signalés et avec preuves et les facteurs démographiques, et les ressources concernant la santé et les services sociaux dans un Etat à dominante rurale aux Etats-Unis.

Méthode: On a analysé les données d'un comté de l'Iowa entre 1984 et 1993 pour faire des associations entre les caractéristiques du comté et les taux de mauvais traitements en utilisant les corrélations à une variable et l'analyse de régression à plusieurs variables. On a mis en corrélation les taux ajustés de la population et les taux suivants: pauvreté de l'enfant, famille monoparentale, mariage et divorce, chômage, abandon du collège, revenu moyen de la famille, sévices sur un aîné, taux de naissance et de décès, nombre d'intervenants sanitaires, médecins et autres, hopital, travailleurs sociaux et nombre de personnes faisant du case-work dans le Département des Services aux Personnes.

Résultats: les taux des familles monoparentales, divorce et abus sur un aîné ont été significativement associés avec les mauvais traitements signalés avec preuves dans l'analyse à variables multiples, alors que les facteurs économiques et la plupart des facteurs de santé ne l'étaient pas. Le signalement et le taux de preuves ont été différents selon les districts après ajustement tenant compte de facteurs multiples, y compris la charge de travail des personnes intervenant en case-work.

Conclusions: Dans cet Etat rural, la structure familiale est plus significativement associée au signalement de mauvais traitements avec preuves que ne le sont les facteurs socio-économiques. Le niveau de ressources pour la Santé dans un comté ne semble pas affecter ces taux.

Resumen

Spanish-language abstract not available at time of publication.