

**RISK FACTORS FOR FATALITIES IN SMALL UNDERGROUND COAL MINES IN THE U.S.**

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**Background** The rate of fatal injuries for small underground coal mines ( $\leq 20$  employees) has consistently been greater than the rate at larger mines. Despite differences between small and large mine characteristics, questions remain regarding reasons for the fatality differences.

**Objective** Explore whether small mines operated more intermittently than large mines, to determine if operational instability contributes to fatalities.

**Methods** A case control study using data from the U.S. Mine Safety and Health Administration from 1983 to 2006. Case mines (fatality;  $n = 139$ ) were identified by the quarter in which a fatality occurred. Control mines (no fatality) were randomly selected (5:1), without replacement, and were matched with case mines if they were operating during the quarter in which the fatality occurred. Student's matched t-test was used to analyze differences between cases and controls for each of the four quarters prior to the fatality for key factors. Matched logistic regression analyses were also used.

**Results** There were no significant differences between cases and controls in the number of employees, hours per employee, or productivity for any of the four quarters prior to the fatality. Recent periods of low productivity, followed by the addition of new workers and an increase in hours worked, were found to be associated with an increased risk of fatality.

**Significance** Results support the implications of a sudden increase in workforce size, overtime, and workload, presumably, to respond to increased needs for coal. Prevention strategies and policies are needed to address risks from operational instability and excess production.