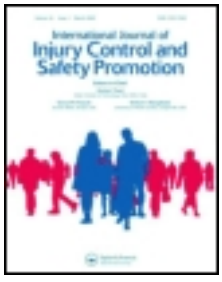

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Impact of youth injuries on the uninsured farm family's economic viability

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The objective of this study is to estimate the impact of youth injuries on the uninsured farm family's economic viability. Using farm prototypes, we compared farm profits with costs of farm youth injuries. We built profit models for two types of farms, dairy and soybean farms. Then we estimated the cost impact of farm youth injuries of different levels of severity on a farm family with no health insurance. A severe child injury that requires at least 10 days of hospitalisation would cost almost equal to the operating profit of the average dairy farm with no health insurance and would turn the operating profit of the average soybean farm into a severe loss of $99,499. Prevention of child agricultural injuries would significantly improve the financial situation for farm families that lack health insurance.

Keywords: farm youth injury; uninsured farm family; injury cost; injury severity; farm profit

A. Introduction

Rural residents, particularly those who reside in rural counties non-adjacent to urban counties, are more likely to be uninsured than non-rural residents. On average, only 24% of them had health insurance in 2002 (Center for Rural Affairs, 2004). Residents of remote rural areas are also more likely to be uninsured for longer periods of time – their chances of being uninsured for an entire year are a third greater than residents of urban counties (Center for Rural Affairs, 2004). Because family farms with less than six employees are exempt from worker's compensation in virtually every state (and larger farms are too in many states), serious injury to a youth on the farm potentially can have a serious financial impact on a farm family that lacks health insurance. For example, the mean cost for a child's agricultural injury hospitalisation was $19,105 in the period 2001–2006 (Zaloshnja, Miller, & Lee, 2011).

Hendricks, Layne, Goldcamp and Myers (2004) estimated that about 1.1 million youth were living on US farms in 2001. During the period 2001–2006, youth less than 20 years of age suffered annually an estimated 26,570 non-fatal injuries on the farm (Zaloshnja et al., 2011). Sixty-six percent (17,533) of these injuries were to youth living in the farm household. This study is the first to estimate the impact of youth injuries on the uninsured farm family's economic health.

B. Methods

Following Cole, Pattanaik and Janssen (2006), we built profit models for two types of farms – dairy and soybean farms – based on their size (in categories described further below). Thus, a farm of certain type and size would serve as a prototype. For example, a 500–1000 acre soybean farm would be a prototype. We added the short term costs of injury to normal farming costs to see how the family's bottom line would be affected at the end of the calendar year. Our hypothesis was that for most farms, a serious injury (one that requires relatively long hospitalisation) could greatly outweigh any profits realised from farming and could jeopardise its viability.

To build the profit models for each farm prototype, we analysed data from the 2006 Agricultural Resource Management Survey (ARMS), which is the US Department of Agriculture's (USDA's) primary source of information on the financial condition, production practices, resource use and economic well-being of America's farm households. The ARMS data collection starts during the fall when crop production practice and cost data are collected, and finishes in the spring with collection of whole farm and livestock production practice and cost data. Data collected for the whole farm include operating characteristics, production practices, farm business financial information and information about the farm operator's household, such as off-farm income. Financial

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information includes receipts from crop and livestock sales, production contracts and government payments. Data are collected on expenses incurred in operating the farm, including the inputs necessary for crop and livestock production and general farm business expenses including repairs and maintenance, taxes, insurance, rent, utilities that cannot be associated with a specific farm enterprise, assets used in the farm operation (including those assets that are owned and those not wholly owned but operated by the farm), and liabilities incurred in operating the farm. In addition, data on non-farm and farm-related income and on non-farm assets are collected for the farm operator's household.

Dairy farms were grouped by herd size (less than 100 cows, 100–499 cows, 500–999 cows and 1000 cows or more). Soybean farms were grouped by acreage (less than 100 acres, 100–499 acres, 500–999 acres and 1000 acres or more).

Our farm profit models include both cash expenditures and non-cash costs. Cash expenditures are incurred when factors of production are purchased or rented. Non-cash costs occur when factors are owned. For example, if a farmer fully owns the land used to produce corn for the cows, (s)he would have no expenditure for land rental or for loans to pay for the purchase of land. Yet, an economic cost arises. By owning the land and using it to grow corn, the farmer foregoes income from other uses of the land, such as renting it to another producer. These costs come about because production resources are limited and have alternative uses. If a farmer uses savings to pay for operating inputs, such as seed, fertiliser, chemicals and fuel, and thus pays no interest on operating loans, the farmer still incurs an economic cost because the savings could have earned a return in another use. Likewise, the farmer has an opportunity cost of his/her labour used in the production of the commodity because it could have been used on another farm or in off-farm employment.

We used the following formula to estimate farm profits:

$$FP = GV - TC - NC - TI$$

where,

FP = farm profits or losses;

GV = gross value of farm production;

TC = tangible production costs, which include all purchased inputs and services like seed, fertiliser, chemicals, fuel, feed, hired labour, veterinary services, etc.;

NC = non-tangible costs, which include the opportunity cost of family labour, the opportunity cost of land, the opportunity cost of farm-produced inputs, the opportunity cost of the investment in purchased inputs and services, and the annual depreciation expenses for machinery and equipment;

TI = taxes and insurance related to farming.

In non-tangible costs, the opportunity cost of family labour hours was valued using an estimate of the wages earned off-farm by farm family members based on the information provided in ARMS. Land was valued according to the average cash rental rate for land in farms of the same type, as provided by ARMS. The costs of home-grown seed and home-grown feed were estimated as the crop prices (provided by ARMS) times the quantities used. Operating interest, which is an estimate of the opportunity cost of the investment in the operating inputs and services during the production period, was based on the 6-month Treasury Bill interest rate in the year of the survey (http://www.federalreserve.gov/Releases/H15/20061226/). The annual depreciation expenses for machinery and equipment were calculated directly from ARMS as a difference between the total depreciation expenses claimed by the farm for the year and the portion claimed for breeding livestock. Government subsidies in the form of direct payments to farmers were not included in our profitability models.

After developing a profitability picture for each farm prototype, we estimated the impact of three severities of farm youth injury on a farm with no coverage for the injured youth's medical care costs. Essentially the injury costs to the farm/farm family become another expense that reduces profits (or increases losses). The three severity groupings are: 1 – injuries that required long hospitalisation (10 or more days); 2 – injuries that required short hospitalisation (less than 10 days); 3 – injuries that did not require hospitalisation. The rationale for this categorisation is that injury costs vary significantly by hospitalisation status and length of stay in hospital.

The short term costs of injury include medical and work loss costs. Our medical costs include emergency medical services, physician, hospital, rehabilitation, prescription and related treatment costs, as well as ancillary costs for crutches, physical therapy, etc. They omit the costs of mental health care for the injured and their family and friends traumatised by an injury incident. We used published unit medical costs (Finkelstein et al., 2006; Miller, Finkelstein, Zaloshjna, & Hendrie, 2005) that had been applied to related analytical files to estimate the cost of injury to farm youth by severity (Zaloshnja et al., 2011).

Short term wage loss has two components. Zaloshnja et al. (2011) assumed that the farm operator

would hire somebody else to do the farm work missed by the injured youth. Zaloshnja et al. (2011) calculated this first wage loss component to farm-youth-specific working schedules by combining information provided in the 2001–2006 Childhood Agricultural Injury Surveys (CAIS) with the mean work days lost per unintentional injury by body part and nature of injury for employed injury victims from Finkelstein et al. (2006). The percentage of a 40-h week worked reported in the survey was used as a multiplier to factor down the injured youth's wage work loss. To compute the second component, they assumed that the lower-earning parent would stay at home with an injured child (losing their earnings) on each day that an adult suffering a comparable injury would have been unable to work. Losses in child household work/chores were not factored into our cost estimates, based on the assumption that a parent or sibling would fill in.

We inflated the medical injury costs to 2006 dollars, using the consumer price index – medical care. Work and household productivity losses were inflated using the employment cost index (ECI), total compensation for total private employment.

C. Results

The medical cost of a youth injury that required 10 or more days of hospitalisation was an estimated $143,580 in 2006 dollars (Table 1). An injury that required less than 10 days of hospitalisation had a medical cost of $6577, whereas an injury that required medical treatment but not hospitalisation had a medical cost of $1373. The short term work loss was $4293 for a hospitalisation lasting 10 or more days, $593 for a hospitalisation lasting less than 10 days and $229 for a non-admitted case.

On average, a dairy farm had a net loss of $42,005 (Table 2). If only operating costs are taken into account, an operating profit of $174,188 would result for the average dairy farm. Profitability rises with size, with breakeven including land rent at roughly 500 cows.

A severe injury that requires 10 or more days of hospitalisation of a farm family's child with no health insurance would almost wipe out the operating profit of the average dairy farm ($174,188 − $143,580 medical costs – $4293 work loss = $26,315). The situation would be far more dramatic for the average small farm (with less than 100 cows), which had an estimated operating profit of only $35,961. For that farm, even a less severe child injury requiring less than 10 days of hospitalisation would be financially onerous – it would cost an estimated $7171 or 20% of the operating profit.

Table 1. The mean costs of farm youth injury, 2006.

Injury type	Medical cost	Short-term work loss
Injury requiring 10 days or more hospitalisation	143,580	4293
Injury requiring less than 10 days hospitalisation	6577	593
Non-admitted Injury	1373	229

The average soybean farm had a net loss of $7045 in 2006, with all sizes of farms experiencing small losses (Table 3). If only operating costs are taken into account, operating profit for soybean farms averaged $48,374. A severe child injury would turn that operating profit into a severe loss ($48,374 − $143,580 medical costs – $4293 work loss = − $99,499). The impact would be worse for the average small farm, which had an estimated operating profit of only $7280. For small farms, even a less severe hospitalised child injury would be financially devastating – it would cost an estimated $7171 or 99% of the operating profit.

D. Discussion

Serious injury to a youth on the farm potentially can have a serious financial impact on a farm family that lacks health insurance. A severe injury that requires 10 or more days of hospitalisation of a farm child with no health insurance would virtually eliminate the operating profit of the average dairy farm and would leave a soybean farm with a large loss. The situation can be much more dramatic for smaller farms. Given that rural residents are more likely to be uninsured than non-rural residents (only 24% of them had health insurance in 2002; Center for Rural Affairs, 2004) and are also more likely to be uninsured for longer periods of time (their chances of being uninsured for an entire year are a third greater than residents of urban counties (Center for Rural Affairs, 2004)), it is important to prevent child agricultural injuries. Prevention would significantly improve the bottom line for farm families that lack health insurance.

Injury cost estimates in this study rely heavily on published unit injury costs, which have several well-documented limitations (Finkelstein et al., 2006; Miller et al., 2005). For example, although the best data available were used in those studies, some of the sources were old, some were based on non-representative samples, and all were subject to reporting and measurement error. Some datasets in the aforementioned studies lacked complete coding information and required imputation of missing data. Moreover, the published unit injury costs used in this study were

Table 2. The profits of a dairy farm family, by size of herd, 2006.

Revenues and costs	<100 cows	100–499 cows	500–999 cows	1000 + cows	All farms
Number of farms	53,324	13,282	1702	1582	69,890
Value of milk sold per farm	132,455	635,628	2,087,937	6,216,680	447,367
Value of cattle sold per farm	13,934	48,254	135,150	560,175	38,186
Other income	4812	20,636	66,196	197,957	14,687
Total, gross value of production	151,201	704,519	2,289,283	6,974,811	500,240
Operating costs per farm:					
Feed					
Purchased feed	31,689	193,878	779,184	2,527,106	147,751
Home-grown harvested feed	43,246	135,881	355,804	619,141	88,710
Grazed feed	2043	4200	4137	4212	2644
Total, feed costs	76,978	333,959	1,139,125	3,150,458	239,105
Other-					
Hired labour	6108	69,006	248,236	682,319	43,180
Veterinary and medicine	7189	35,335	113,085	273,770	22,912
Bedding and litter	3123	10,439	23,444	37,907	6462
Marketing	2220	10,937	33,098	113,720	7637
Custom services	3882	17,962	63,438	147,414	12,043
Fuel, lube, and electricity	6907	23,039	67,575	168,474	16,156
Repairs	6986	25,306	66,196	151,626	16,449
Interest on operating capital	1846	7750	24,824	67,389	5287
Total, operating cost	115,240	533,731	1,779,021	4,793,077	369,232
Non-tangible costs:					
Opportunity cost of unpaid labour	63,931	76,304	74,471	71,601	67,560
Capital recovery of machinery and equipment	40,792	120,217	279,954	699,166	83,129
Opportunity cost of land (rental rate)	530	1058	1379	4212	881
Taxes and insurance	2940	9215	24,824	54,754	6,169
General farm overhead	6816	26,468	60,680	113,720	15,275
Total non-tangible costs	115,009	233,262	441,308	943,453	173,013
Total cost per farm	230,249	766,993	2,220,329	5,736,530	542,245
Value of production less operating costs	35,961	239,793	758,497	2,864,053	174,188
Value of production less total costs listed	−79,049	−62,474	68,954	1,238,282	−42,005

Note: Coefficients of variation (CVs) were checked for the category totals: gross value of production, and feed, operating, non-tangible and total costs. All CVs were less than 25%.

Table 3. The profits of a soybean farm family, by size of farm, 2006.

Revenues and costs	<100 acres	100–499 acres	500–999 acres	1000 + acres	All farms
Number of farms	129,393	115,079	25,097	9,541	279,110
Gross value of soybeans sold per farm	12,535	64,225	177,812	423,857	77,217
Operating costs per farm:					
Seed	1717	8048	22,655	53,223	9787
Fertiliser	913	3288	8528	20,931	3954
Chemicals	749	3487	10,338	24,830	4381
Custom operations	739	1565	3712	7090	1821
Fuel, lube, and electricity	575	3204	10,170	23,446	4094
Repairs	419	2723	8738	22,434	3575
Purchased irrigation water	0	40	105	0	33
Interest on operating capital	122	531	1524	3612	658
Hired labour	21	216	1419	5722	539
Total, operating costs	5255	23,101	67,188	161,288	28,843
Non-tangible costs:					
Opportunity cost of unpaid labour	1082	4340	9751	18,804	4606
Capital recovery of machinery and equipment	2354	14,672	44,100	106,091	18,295
Opportunity cost of land (rental rate)	4163	22,233	60,261	136,914	26,110
Taxes and insurance	650	2048	5138	11,478	2403
General farm overhead	1111	3594	8402	17,302	4006
Total non-tangible costs	9361	46,887	127,651	290,589	55,419
Total costs per farm	14,616	69,988	194,839	451,878	84,261
Value of production less operating costs	7280	41,123	110,624	262,568	48,374
Value of production less total costs of farming	−2081	−5764	−17,028	−28,021	−7045

Note: Coefficients of variation (CVs) were checked for the category totals: gross value of production, and feed, operating, non-tangible, and total costs. All CVs were less than 25%.

modelled; as such, no variance around them could be calculated.

Following established practice in health services research (Drummond, Sculpher, Torrance, O'Brien, & Stoddart, 2005), we used mean medical costs per injury instead of median costs because someone actually pays the bill for the high-cost injuries. For example, if hospital stays cost $1000 per day and three of four injuries involved 2-day stays while the fourth involved a 10-day stay, the median savings from preventing these injuries would be $2000 but the mean savings from preventing them would be $4000 ($2000 × 3 + $10,000)/4. The wide variations in length of hospital stay reported in Finkelstein et al. (2006) suggest that its unit costs, which we used in this study, have large variances. As a result, our cost savings estimates probably have a wide uncertainty range.

Government subsidies in the form of direct payments to farmers were not included in our profitability models because there is no reason to assume that they are correlated to farm youth injury costs. To the extent they are positively correlated to injury costs, the farm family profitability picture after a farm youth injury would improve.

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