The Economic Burden of All-Terrain Vehicle Related Adult Deaths in the U.S. Workplace, 2003-2006

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Abstract. *The objective of this study was to estimate the societal economic burden associated with work-related ATV fatalities among civilian persons more than 17 years of age in the U.S. from 2003 through 2006. ATV death data were obtained from the Bureau of Labor Statistics' annual Census of Fatal Occupational Injuries. Costs were estimated using a model employing a cost-of-illness method developed by the National Institute for Occupational Safety and Health. From 2003 to 2006, a total of 129 work-related ATV deaths occurred among persons more than 17 years of age in the U.S., nearly doubling from 20 deaths in 2003 to 39 deaths in 2006. The collective lifetime cost of the deaths was $103.6 million (M), with a four-year mean of $803,100 and a four-year median of $772,100. Decedents age 35 to 54 years accounted for one-third of the deaths (n = 41) at a cost of $50.1 M. Montana had the most deaths (13). Fifty-two percent of the deaths were overturns costing $48.3 M. Eighty-four (65%) of the deaths were workers in agricultural production at a cost of $62.3 M. Short-term investment in prevention measures, such as training and helmets for workers, could provide lasting dividends by preventing work-related ATV deaths and reducing their economic impact.*

Keywords. *Agriculture, All-terrain vehicle, Economic burden, Fatality, Lifetime societal costs.*

Occupational injuries continue to exert a huge burden on society in terms of the number of fatal and nonfatal events, as well as the lifetime economic costs related to those events. This burden has been analyzed from a variety of perspectives, including but not limited to the demographic characteristics of the victim, type and nature of injury, industry and occupation, costs in relation to the gross domestic product, workers' compensation costs, and the state where an injury occurred (Biddle, 2004; Leigh, 2011; Leigh and Miller, 1997; Leigh et al., 1997; Leigh et al., 2004; Leigh et al., 2006; Miller and Galbraith, 1995; Biddle, 2009; Biddle and Keane, 2011; Waehrer et al., 2004). Studies over the past two decades have employed various data sources and analytical methods to quantify and define occupational injuries and deaths, and estimate the associ-

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ated costs of these injuries.

During this 20-year period, a new area of interest began to emerge focusing on injuries and related costs from the use of all-terrain vehicles (ATVs), primarily from the recreational-use perspective (Helmkamp, 2002; Helmkamp and Lawrence, 2007; Helmkamp et al., 2008; Helmkamp et al., 2009). Only recently have ATV injuries resulting from the use of ATVs in the workplace been analyzed. Nearly 300 persons died in ATV crashes at work from 1992-2007, averaging 10 per year in the first ten years and 32 per year in the following six years (Helmkamp et al., 2011). We are not aware of any studies addressing the economic costs of ATV-related injuries occurring in the workplace.

Methods

Fatality Data

Fatality information was obtained from the U.S. Bureau of Labor Statistics' (BLS) Census of Fatal Occupational Injuries (CFOI) for the years 2003-2006; the same four-year period for which the cost model derived estimates. The CFOI compiles work-related fatal injury data from multiple sources, including death certificates, medical examiner records, workers' compensation claims, and reports to OSHA for decedents of any age. The data for this study excluded military personnel, fatalities occurring in New York City, and decedents less than 18 years of age or with unknown age or sex. While CFOI data were available for younger ages, 18 years was chosen as the lower limit to parallel earlier research (Helmkamp, 2011).

The source of injury in the CFOI identifies the object or substance that directly produced or inflicted injury and is coded based on the Occupational Injury and Illness Classification System Manual (BLS, 2007). Fatalities involving ATVs were identified using the primary source code 841: All-terrain vehicle. Characteristics of these work-related fatalities were described in terms of worker demographics (e.g., sex, race, ethnicity, and age), injury incidence counts, event or exposure, and industry at the time of death. The state where the fatal incident occurred was also reported. Industry was coded based on the North American Industrial Classification System (OMB, 2002).

Cost Estimation

Costs (expressed in thousands of U.S. 2006 dollars) of fatal occupational injuries were estimated using a model developed by the National Institute for Occupational Safety and Health (NIOSH) Division of Safety Research (Biddle, 2004, 2009; Biddle and Keane, 2011). The model derived the overall societal cost of fatal occupational injuries using the cost-of-illness method, which combines direct and indirect costs. Direct and indirect costs were derived independently and summed for each demographic and case characteristic. The single direct cost used in these estimates was a four-year average medical cost of occupational injuries obtained from the Detailed Claims Information database of the National Council on Compensation Insurance (NCCI, 1995). The dollar value was adjusted to 2006 dollars using the Medical Care Index of the Consumer Price Index (BLS, 2009a). The indirect lifetime cost of an individual work-related fatal injury was derived by calculating the present value of lost household production and future earnings of the decedent summed from the year of death until that decedent would have reached age 67, accounting for the probability of survival were it not for the premature work-related death. Sixty-seven was selected based on the retirement age of a substantial portion of the current workforce in the U.S. This method of deriving indirect costs is the human capital approach (Rice, 1965).

The earnings component of the cost model consists of four parts: base wage, fringe benefits, economy-wide productivity growth, and life-cycle wage growth. The base wage was established from the occupation of the decedent, the year, and the state where the injury occurred at the time of death using the BLS Occupational Employment Statistics, a federal-state cooperative semi-annual establishment survey (BLS, 2008a). Because this survey does not provide wage data by age, the wage value was adjusted to account for the age of the decedent at the time of death using a NIOSH-developed algorithm. The base wage was adjusted to include the value of employee fringe benefits using BLS Employer Cost for Employee Benefits data from the National Compensation Survey Program (BLS, 2008b). The BLS Employment Cost Index (BLS, 2008c) was used to estimate the amount that wages increased in concert with the growth of the U.S. economy as a whole. To account for the final component of wage growth, estimates of life-cycle growth (i.e., salary growth due to individual worker experience) were used to adjust the base wage. The data for each wage value was adjusted to 2006 dollars using the GDP Deflator (BEA, 2007). Non-market losses or loss of household production were derived from time-diary data captured in the National Human Activity Pattern Survey study commissioned by the U.S. Environmental Protection Agency (Expectancy Data, 2000). Household production time was defined as activities that could produce benefit for all members of the household, including housework, food preparation, cooking and cleanup, outdoor chores, plants and animals, home and auto maintenance, providing care, and obtaining goods and services. The market replacement value of this time was based on the hourly wages plus the employer's legally required benefit costs from the BLS Occupational Employment Statistics survey and the BLS Employers Compensation Cost Report (BLS, 2008a, 2009b). Using the GDP Deflator, the data for each wage value was adjusted to 2006 dollars, the last year for which fatality cost data were derived (BEA, 2007).

Mathematically, the indirect cost calculation is represented as follows:

$$\text{PVF} = \sum_{n=y}^{67} P_{y,q,s}(n)\left[Y_{s,j}(n) + Y_s^h(n)\right] \times (1+g)^{n-y} \Big/ (1+r)^{n-y} \tag{1}$$

where

PVF = present discounted value of loss per person due to an individual occupational fatal injury

$P_{y,q,s}(n)$ = probability that a person of age y, race q, and sex s will survive to age n

q = race of the individual decedent

s = sex of the individual decedent

n = age if the individual had survived

$Y_{s,j}(n)$ = median annual compensation of an employed person of sex s, specific occupation j, and age n (includes median annual earnings, benefits, and wage growth adjustments)

j = specific occupation of individual at death

$Y_s^h(n)$ = mean annual imputed value of household production h of a person of sex s and age n

g = earnings growth rate attributable to overall productivity

y = age of the individual at death

r = real discount rate (3%).

The overall model described above has been used extensively to estimate the cost of fatal occupational injuries and most recently by Leigh (2011) and Pollock (2010), who applied it when analyzing Australian farm-related fatalities.

Results

An average of 32 work-related ATV deaths occurred each year, nearly doubling from 20 deaths in 2003 to 39 deaths in 2006. The collective lifetime cost of the 129 deaths was $103.6 million (M), with mean and median costs for each individual death of $803,100 and $772,100, respectively (table 1). The mean cost of a fatal occupational injury ranged from a low of $727,500 in 2006 to a high of $915,100 in 2003. Similarly, the median costs ranged from $706,900 in 2006 to $920,900 in 2004.

Table 2 shows that males accounted for 90% (116) of the deaths and 84% ($87.5 M) of the total costs, whites accounted for 95% (122) of the deaths and 92% ($98.7 M) of the total costs, and non-Hispanics accounted for 81% (104) of the deaths and 82% ($84.7 M) of the total costs. Mean and median costs for female victims ($1.2 M and $1.1 M, respectively) were considerably higher than for males ($754,400 and $742,400, respectively). Decedents ages 35 to 54 accounted for nearly 32% of the deaths (41) and 48% ($50.1 M) of the total costs, while decedents 55 years or older accounted for about 47% (60) of the deaths and only 22% ($22.3 M) of the total costs. The mean cost was highest for those ages 35 to 54 at $1.2 M, which was more than 10 times greater than the mean cost for decedents 65 years and older, $116,900 (table 2).

Eleven states, all in the western U.S., accounted for 63% of the ATV-related deaths with four states, Montana (13), Texas (10), Colorado (9), and South Dakota (9), accounting for nearly one-third of all ATV deaths during the four-year period (table 3). Other

Table 1. Number and lifetime costs of fatal occupational injuries involving all-terrain vehicles (ATVs) by year in the U.S., 2003-2006.[a]

Year of Death	Number	Mean Cost	Median Cost	Total Cost
2003	20	915.1	748.7	18,302.5
2004	34	856.2	920.9	29,111.6
2005	36	772.7	740.3	27,815.6
2006	39	727.5	706.9	28,372.1
All years	129	803.1	772.1	103,601.9

[a] Costs are expressed in thousands of 2006 U.S. dollars.

Table 2. Number and lifetime costs of fatal occupational injuries involving all-terrain vehicles (ATVs) by worker characteristic in the U.S., 2003-2006.[a]

Characteristic		Number	Mean Cost	Median Cost	Total Cost
Sex	Male	116	754.4	742.4	87,512.4
	Female	13	1,237.6	1,056.4	16,089.4
Race	White	122	809.3	786.3	98,729.9
	All others	7	696.0	742.1	4,872.0
Ethnicity	Non-Hispanic	104	814.8	785.0	84,740.6
	Hispanic	25	754.4	755.3	18,861.2
Age	18-24	9	952.9	856.5	8,576.4
	25-34	19	1,188.1	932.5	22,573.4
	35-54	41	1,222.8	1,165.2	50,134.7
	55-64	25	729.0	695.9	18,225.5
	65+	35	116.9	108.6	4,091.9

[a] Costs are expressed in thousands of 2006 U.S. dollars.

Table 3. Number and lifetime costs of fatal occupational injuries involving all-terrain vehicles (ATVs) by state in the U.S., 2003-2006.[a]

State of Injury	Number	Mean Cost	Median Cost	Total Cost
California	6	797.8	730.9	4,786.8
Colorado	9	637.3	613.4	5,735.8
Iowa	5	1,061.6	867.0	5,308.2
Kansas	5	732.1	826.9	3,660.5
Minnesota	6	886.1	659.9	5,316.4
Missouri	6	837.3	1,051.6	5,023.9
Montana	13	587.7	417.1	7,639.9
Nebraska	7	1,218.3	1,297.2	8,528.1
South Dakota	9	1,105.7	996.4	9,950.9
Texas	10	977.1	917.3	9,771.1
Wyoming	5	621.7	284.2	3,108.5
Other states (n = 27)[b]	48	724.4	744.2	34,771.7
All states	129	803.1	772.1	103,601.9

[a] Costs are expressed in thousands of 2006 U.S. dollars.
[b] Other individual states are not presented as they did not meet publication criteria.

states were not listed because the number of deaths did not meet publication criteria. Individual mean costs exceeded $1 M in three states (Iowa, Nebraska, and South Dakota), and median costs exceeded $1 M in two states (Missouri and Nebraska). Montana, the state with the highest number of fatalities, also had the lowest mean cost ($587,700), which was less than half of the highest mean cost ($1.2 M) in Nebraska. Twenty-seven other states accounted for the remaining 48 deaths.

Most of the ATV fatalities resulted from transportation-related incidents. More than three-quarters of the incidents occurred off the highway, specifically involving non-collision events. The total cost of non-highway incidents ($76.6 M) was more than three times that of highway incidents ($25.2 M), while their mean costs were substantially lower: $765,600 compared to $934,800 (table 4). ATV overturns, accounting for over half of all fatalities, were the most common direct event identified in the non-collision events, incurring a total cost of $48.3 M, despite having the lowest mean ($721,400) and median costs ($627,800). The highest mean cost ($1.1 M) was observed for the highway collisions involving an ATV and another vehicle; non-highway collisions between an ATV and other vehicles or mobile equipment had the highest median cost ($1.0 M).

Nearly 70% of the fatal ATV crashes occurred in the agriculture industry, with a majority of these in the animal production (51) and crop production (33) industry subsectors

Table 4. Lifetime costs of fatal occupational injuries resulting from transportation incidents involving all-terrain vehicles (ATVs) by event or exposure in the U.S., 2003-2006.[a]

Event or Exposure[b]	Mean Cost	Median Cost	Total Cost
41 Highway	934.8	981.6	25,239.2
411 Collision between vehicle	1,084.2	906.6	10,842.4
414 Non-collision accident	743.2	839.3	9,662.2
4141 Jack-knifed or overturned	743.2	839.3	9,662.2
42 Non-highway	765.6	748.7	76,563.6
421 Collision between vehicle or mobile equipment	986.3	1,023.4	5,917.6
422 Vehicle struck stationary object	738.3	817.9	8,859.6
4220 Vehicle or mobile equip. struck stationary object	738.3	817.9	8,859.6
423 Non-collision	728.9	695.9	57,583.0
4233 Overturned	721.4	627.8	48,331.7

[a] Costs are expressed in thousands of 2006 U.S. dollars.
[b] Codes were assigned based on the BLS Occupational Injury and Illness Classification System (OIICS). Other events or exposures are not presented as they did not meet publication criteria.

Table 5. Number and lifetime costs of fatal occupational injuries involving all-terrain vehicles (ATVs) by industry in the U.S., 2003-2006.[a]

Industry[b]	Number	Mean Cost	Median Cost	Total Cost
Agriculture, forestry, and fishing	90	733.1	629.7	65,976.2
111 Crop production	33	810.1	706.9	26,734.8
112 Animal production	51	697.7	613.4	35,582.2
112111 Beef cattle ranching and farming	20	524.3	252.2	10,486.2
112120 Dairy cattle and milk production	7	928.0	742.1	6,495.9
Construction	6	1,092.1	1,105.6	6,552.4
Services	23	948.1	867.4	21,805.3
561 Administrative and support services	6	751.2	814.7	4,507.3

[a] Costs are expressed in thousands of 2006 U.S. dollars.
[b] Other individual industries are not presented as they did not meet publication criteria.

(table 5). Within the animal production subsector, 20 decedents were working in beef cattle ranching and farming. The six deaths in the construction industry resulted in the highest mean costs ($1.1 M) and median costs ($1.1 M) compared with the other industries that met publication criteria. While mean and median costs were highest within the construction industry, the few deaths precluded a subsector breakdown.

Discussion

This study describes the number of work-related ATV deaths from 2003-2006 and the resulting societal costs and their economic impact. It is difficult to fully describe the mean costs in any detail as the differences may be attributable to the definition of the variables used in our model as well as the method of calculating those costs. For this study, the age and wage of the worker at time of death had the largest impact on the overall costs. For example, older workers (55 years and older) had the lowest mean costs of all age groups. The model calculated and aggregated yearly losses through age 67 for those under 67 and for a single year for those over 67. Thus, a worker who was 55 at the time of death had ten years of accumulated loss compared to a worker who was 35 at the time of death and had 30 years of accumulated loss.

The wage of the worker at time of death also had a substantial impact on the cost. For example, the mean loss for a decedent age 42 at the time of death with a median wage of approximately $24,000 was slightly under $950,000, while the costs for a decedent of the same age but at a wage of nearly $40,000 was just over $1.3 M. Despite the similarity in the average annual wages of females ($43,860) and males ($44,395), the highest annual wages for males were observed in the oldest workers (i.e., those having the fewest number of remaining years in the workforce), lowering their mean cost ($754,400) below the overall mean cost for females ($1.2 M). Although there were fewer (20) fatalities in 2003, many of these decedents were much younger, thereby contributing to a higher mean cost ($915,100) compared to 2004-2006, during which there were more annual fatalities but the decedents were older, resulting in lower mean costs: $856,200 in 2004, $772,700 in 2005, and $727,500 in 2006. On the other hand, one might expect the mean cost for decedents ages 18 to 24 to be higher than for the other age groups because younger workers have more years of working life left, but our results indicated otherwise and may be due to a lower wage.

The number (129) and total lifetime cost ($103.6 M) of work-related ATV deaths, coupled with the increased use of ATVs in many occupational settings, allows for the exploration of preventive actions that might mitigate the severity of the outcomes and reduce the economic burden of these fatalities. The following two interventions (training and helmets) are examples where adoption may prove beneficial to reduce the number and associated costs of fatal occupational ATV injury regardless of the demographic and case characteristics.

Training has long been used to provide workers with knowledge and skills to identify hazards, reduce the risk of injury, and work safely. There is evidence that ATV licensing requirements across the states are quite variable and have not contributed to a noticeable decrease in fatality rates (Helmkamp et al., 2012). The ATV Safety Institute (ASI) conducts most of the hands-on training for the recreational use of ATVs in the U.S. Additionally, they provide safety materials and conduct specialized ATV safety training for a variety of public and private organizations. These occupationally focused efforts have been provided to law enforcement, military, border patrol, and geophysical companies, as well as large corporations, such as AT&T (ASI, 2011). As part of these efforts, ASI conducts specialized half-day training for $150 per trainee or four-day Instructor Preparation Programs (i.e., a train-the-trainer program) for $600. ASI supplies student handbooks and materials free to "agency" instructors. Saving the overall mean value of a single work-related ATV fatal injury ($803,100) would allow the federal government to cover the cost to train approximately 1,340 instructors nationwide or nearly 5,350 individual ATV operators throughout the U.S. However, if the savings were from a fatality in Montana (based on a mean cost of $587,700), the state government could train nearly 1,000 instructors and approximately 4,000 individual workers in the state. More impressively, the savings from preventing a single fatality in Nebraska (based on a mean cost of $1.2 M) could train more than 2,000 instructors and more than 8,100 individual workers.

Despite helmet use decreasing the mortality and morbidity associated with ATV-related crashes, legislation or regulation requiring helmet use has had minimal impact and has been problematic to enforce. Currently, state laws vary widely on the requirement to wear helmets for the recreational use of ATVs (Helmkamp et al., 2012) but do not directly address occupational use. At the federal level, no standards or regulations exist that explicitly govern the use of personal protective equipment when using ATVs in the workplace. While OSHA can use the General Duty Clause to protect employees, its application in agriculture (e.g., self-employed and <11 employees) is limited (OSHA, 2012). Both OSHA (OSHA, 2006) and NIOSH (NIOSH, 2012) have developed useful informational products designed to provide employers and workers with basic guidelines for the safe use of ATVs at work.

Motorcycle helmets, often used by ATV operators, are offered in a variety of styles and prices. The U.S. Department of Transportation (DOT) and the Snell Memorial Foundation are the two organizations that set safety standards for motorcycle helmets; DOT sets the minimum standards that all motorcycle helmets must meet for public street use, while Snell requires helmets to withstand substantially greater impacts than DOT (Snell, 2011). It is reasonable to expect that the more expensive helmets meet Snell impact criteria and thus offer more protection for the user. A recent online review of 73 DOT-approved full-face shield adult motorcycle helmets (LeatherUp, 2011) from several leading manufacturers (e.g., Arai, Bell, Scorpion, Shoei, and HJC) indicated individual helmet costs ranging from $49.95 to $827.56, with an average cost of $290.86. The mean cost associated with preventing one fatality ($803,100) could fund the purchase of approximately 1,000 to 16,000 helmets, clearly a positive investment in prevention. The effectiveness of helmets in reducing ATV-related injuries and deaths has generally received minimal attention. Bowman et al. (2009) showed that un-helmeted riders were more likely to receive significant injuries to the head, face, and neck region.

It is reasonable to conclude that an investment in active interventions such as training and/or helmets for U.S. workers could potentially reduce the number of lives lost to ATV crashes and thus reduce the total lifetime costs of these incidents and their economic impact. Additional research however, should be conducted to evaluate these interventions and other prevention strategies that focus on specific case and demographic characteristics of interest, such as older workers and workers engaged in crop and animal production. It is also of critical importance to emphasize the need to develop and evaluate passive systems related to the engineering design of ATVs. We are aware of ongoing simulation modeling on a variety of risk factors and crash scenarios, including changing speeds and engine sizes, terrain and surfaces, tire grip, size of drivers, and hand grip (Wordley and Field, 2012; Thorbole et al., 2011).

Strengths and Limitations

Since this study is complementary to and an extension of an earlier article describing the frequency and rates of work-related ATV deaths, it is subject to the same strengths and weaknesses discussed therein (Helmkamp et al., 2011). To wit, CFOI uses multiple data sources to capture work-related fatality information, may undercount cases due to verification of work-relatedness, and may not provide information on contributing factors, such as the use of helmets, ATV speed, or operator training and experience. This study was designed to match the age range explored in the aforementioned ATV fatality study and therefore excluded decedents less than 18 years of age. We acknowledge that our study excluded younger workers who often use ATVs on farms and who are sometimes injured or killed when using them (Goldcamp et al., 2006). The lack of accurate counts of ATVs in the workplace limits the calculation of exposure-based fatality rates. While this aspect, as well as costs associated with non-fatal injuries such as workers' compensation and property damage, was not explored in this study, these are important additional components in determining the overall burden exacted by ATVs in the workplace, both personally and economically.

Additionally, the cost-of-illness model used in this study produced a conservative estimate for lifetime economic costs of fatal work-related ATV injuries. Moreover, these estimates were not exact; they were approximations based on many factors and were subject to limitations of the model specification and limitations associated with the data inputs. The model specification was limited by not producing a "complete" economic cost of occupational fatalities because intangible losses associated with premature death were not included. While it may be intuitively appealing to provide some quantitative measure of these costs, rather than simply disregarding them in determining the overall burden of the fatal injury, it is inescapable that the nature of the losses—pain, suffering, and emotional harm to the injured and the family—involve a subjective and personal component that is difficult, if not impossible, to measure. A further qualification of the findings of this study is that the use of a single category in the model to represent all direct costs of a fatal occupational injury contributed to the conservative nature of these estimates. Furthermore, the direct medical cost used in this study may be overestimated, as workers' compensation medical costs may be higher than those not covered by workers' compensation, and the distribution of decedent's expenses that were covered by workers' compensation is not known (Baker and Krueger, 1995).

The cost of helmets is somewhat problematic in that the figures we used were obtained from one of many websites that listed a variety of helmets of differing quality. We randomly chose 73 helmets out of 322 from one site (LeatherUp, 2011) that featured models from leading helmet manufacturers; all helmets were DOT-approved and fitted with a full face mask. Many other helmets were available without the full face mask and were less expensive. Other websites offered similar choices within the same price range, so we felt our selection was reasonable.

Conclusions

The vast majority of ATV research over the past 20 years has focused on injuries and deaths resulting from recreational ATV use, and only recently have deaths from the occupational use of ATVs been addressed (Helmkamp et al., 2011). Traditionally, ATVs have been used for recreational purposes, but a recent survey of ATV owners reported that about one-fifth of available ATVs were used for work and utility purposes. Since ATVs are defined as multi-use vehicles, it is reasonable to assume that ATVs are used for both recreational and work activities, particularly by the self-employed (GAO, 2010). Furthermore, the U.S. Consumer Product Safety Commission reports that recreational use of ATVs has increased significantly over the years, from 1.9 M ATVs in 1992, to 5.6 M in 2002, to 10.6 M in 2010 (CPSC, 2011). While all ATV-related deaths increased by 19%, from 892 in 2003 to 1,064 in 2006 (NCHS, 2010), work-related ATV deaths increased by 95% during the same period, from 20 in 2003 to 39 in 2006. Assuming that the use of ATVs in the workplace increases at a similar or faster pace than in recreational settings, ATV fatal injury counts will likely continue to rise substantially in the future.

To our knowledge, this study represents the first effort to describe the societal cost of work-related ATV deaths. This study, reporting the lifetime societal costs resulting from ATV deaths in the workplace, provides a better understanding of the impact and public health burden of fatal ATV injuries in the workplace. In concert with this study's companion article (Helmkamp et al., 2011), which described ATV-related deaths in the workplace for the first time, more emphasis needs to be placed on the development and evaluation of both active and passive prevention strategies that must be embraced by workers and their employers. The short-term investment in prevention measures, such as training and helmets for hundreds of thousands of workers, could provide lasting dividends by preventing deaths and reducing their economic impact. While this article has addressed fatal ATV injuries exclusively, we acknowledge that many more workers receive non-fatal injuries, and the costs associated with these events must be recognized as a critical component for defining the overall economic burden resulting from ATV-related injuries in the workplace.

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