

Work-related Road Traffic Injuries in the Philippines: Trends and Determinants from 2010 to 2020

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ABSTRACT

Background. Work-related transport and vehicular crashes (TVCs) contribute substantially to morbidity and mortality among the working population and negatively affect economic productivity. Despite the growing burden of road traffic injuries globally, limited data exist on work-related road crashes in the Philippines.

Objective. The study aimed to describe trends in work-related TVCs in the Philippines from 2010 to 2020 and identify risk factors associated with adverse patient outcomes.

Methods. Data were obtained from the Department of Health's Online National Electronic Injury Surveillance System (ONEISS) from 2010 to 2020. Cases categorized as work-related under the activity variable were included. Variables analyzed included demographic characteristics, vehicle type, risky road user behaviors, use of safety equipment, and injury type. Descriptive statistics were used to summarize trends. Logistic regression analysis examined factors associated with mortality, while chi-square tests assessed associations between injury patterns and crash-related factors.

Results. A total of 15,451 work-related TVC cases were recorded from 2010 to 2020. Reported cases increased from 910 in 2010 to 2,180 in 2019, with a corresponding rise in deaths during the same period. Both cases and deaths declined in 2020, likely due to reduced mobility during the COVID-19 pandemic. Two- and three-wheeled vehicles were the most frequently involved, with motorcycles and tricycles predominating. Alcohol use and sleep-related factors were the most commonly reported risky behaviors. A majority of victims (70.90%) did not practice safe driving behaviors. Significant risk factors for mortality included vehicle type and age, while alcohol use was associated with multiple injuries.

Conclusion. Work-related TVCs remain an increasing occupational and public health concern in the Philippines. Strengthening road safety requires coordinated, multi-sectoral action involving government agencies, employers, and workers, with emphasis on road safety education, enforcement of safety measures, and targeted prevention strategies.

Keywords: work-related road crashes; occupational safety; driving behavior; traffic injury patterns



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INTRODUCTION

A road traffic crash is defined as a collision or incident occurring on a public road that involves at least one vehicle and may or may not result in injury. Road traffic injuries refer to fatal or non-fatal injuries resulting from road crashes.¹ Road crash injuries remain a neglected public health problem globally.² According to the World Health Organization, road crashes claim an estimated 1.35 million lives each year.³ A disproportionate burden of mortality is observed among nations, with low- and middle-income countries (LMICs) accounting for more than 90% of global road traffic fatalities.³ This disparity has been attributed to rapid urbanization and increased motorization in LMICs.³

The Social Security Organization (SOC SO), a Malaysian government agency, reported that 88% of road crash accidents occur while traveling to and from workplaces, as cited by Nordin in 2014.⁴ This highlights the phenomenon of work-related transport and vehicular crashes (TVCs).⁵

Occupational injury is defined as any injury resulting from a work-related event involving a single instantaneous exposure in the work environment.⁶ Occupational accidents, meanwhile, refer to unexpected and unplanned occurrences, including acts of violence arising out of or in connection with work, that result in personal injury, disease, or death among workers.⁷

In the Philippines, the labor force comprises approximately 41.2 million employed individuals aged 15 years and older, representing a 93.7% employment rate and a 63.7% labor force participation rate.⁸ This large working population is potentially at risk for occupational accidents and injuries, including work-related road traffic incidents.

The International Labour Organization (ILO) defines commuting accidents as accidents occurring on the direct route between the workplace and: (a) the worker's principal or secondary residence; (b) the place where the worker usually takes meals; or (c) the place where the worker usually receives remuneration, resulting in death or personal injury with loss of working time.⁹ Because many workers travel by road, commuting accidents are often considered road traffic accidents. Work-related traffic accidents, on the other hand, are unintentional incidents causing injury to vocational drivers or riders while operating a vehicle in the course of work.¹⁰

There is limited comprehensive literature on work-related road crashes in the Philippines. This study seeks to address this gap by examining work-related traffic and vehicular crashes (TVCs) in the country. Road crashes were categorized as work-related if they occurred: (1) during commute to or from work or another economic activity; (2) during travel for company-related recreational or leisure activities; or (3) while commuting via private or company-leased vehicles to another work location or economic activity. In accordance with the ILO, transport or road traffic accidents in which workers are injured while engaged in economic activity or while

carrying out the business of the employer are considered occupational accidents.^{11,12}

This study investigates work-related TVCs in the Philippines using national injury surveillance data.

METHODS

Study Design and Data Source

This study utilized data from the Online National Electronic Injury Surveillance System (ONEISS), the national injury surveillance system of the Philippines managed by the Department of Health (DOH). From 2010 to 2020, a total of 37 DOH hospitals, 98 government hospitals, and 167 private hospitals submitted reports to ONEISS.

ONEISS is a computer-based system designed to store, consolidate, and transform injury-related data into meaningful information.¹³

Study Population and Variables

The ONEISS database from 2010 to 2020 was filtered to include only work-related transport and vehicular crash (TVC) cases. Work-related transport crashes were identified based on the "Activity" variable coded as work-related (e.g., going to work) and corresponding mechanisms of injury.

The variables analyzed included:

- **Demographic variables:** age, sex, and civil status.
- **Pre-admission information:** type of admission (emergency room or outpatient), first aid management, place of injury (POI), time of injury (TOI), nature of injury (NOI), external cause of injury, and intent.
- **Clinical data:** patient severity, emergency room and inpatient outcomes, disposition, and transport details.
- **Risk factors:** risky road user behaviors and use of safety vehicular equipment.

ONEISS includes information on patient activity at the time of injury. Cases categorized as "Work-related" under the activity variable were examined to determine associations between mortality, types of injuries sustained (e.g., abrasion, concussion), and road safety factors such as risky and safe driving behaviors, as well as vehicle type.

Statistical Analysis

Descriptive statistics were used to summarize data and present findings in tables, charts, and graphs.

Logistic regression analysis was performed to determine the association between patient outcomes (dependent variable) and selected independent variables, including age, vehicle type, risky road user behavior, and use of safety equipment.

Chi-square tests of association were conducted to assess relationships between patient injuries and activity prior to the crash.

Ethical Considerations

Approval was obtained from the Department of Health – Single Joint Research Ethics Board (DOH-SJREB) prior to data processing and analysis. Ethical approval ensured adherence to research standards, protection of patient confidentiality, and compliance with applicable ethical guidelines.

RESULTS

A total of 15,451 work-related transport and vehicular crash (TVC) cases were reported in the ONEISS database from 2010 to 2020. The sampling unit was defined per accident case rather than per individual; therefore, no socio-demographic profile per person is presented.

After excluding 307 cases with missing “Year” data, 15,144 cases were included in the trend analysis. The number of work-related TVCs generally increased from 910 cases in 2010 to 2,180 cases in 2019. A temporary decline was observed in 2013 (472 cases) and again in 2020 (962 cases). The decline in 2020 may be attributed to mobility restrictions imposed during the COVID-19 pandemic (Figure 1).

Although deaths represented a small proportion of total cases, fatalities due to work-related TVCs demonstrated a fluctuating but overall increasing trend from 2010 to 2019. Similar to overall case counts, deaths declined sharply in 2020 (Figure 2).

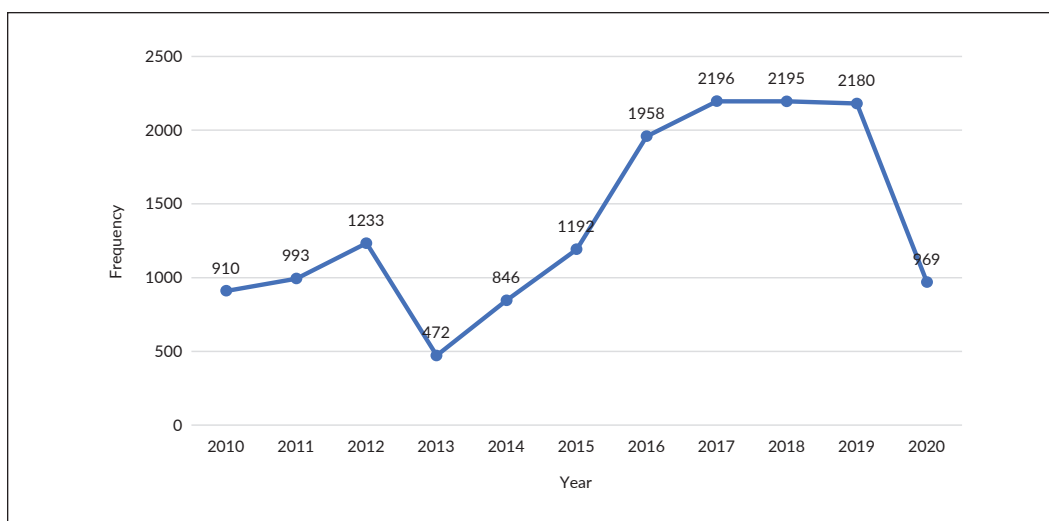


Figure 1. Distribution of Work-related Injuries among TVC Patients from 2010 to 2020 (N = 15,144).

Note: Total N = 15451 (15,144 analyzed; 307 with missing “Year” information).

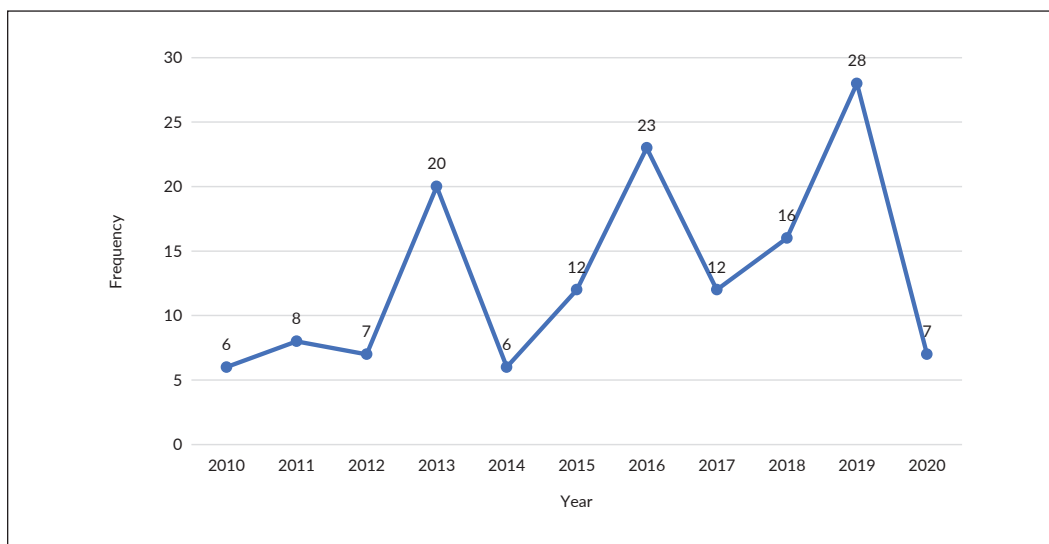


Figure 2. Patient Deaths from 2010 to 2020 due to Work-Related Injuries in TVC Cases.

Vehicle Type

Motorcycles were the most commonly involved vehicle type in work-related TVCs (n = 8,800), followed by tricycles (n = 1,411), other vehicle types (n = 1,341), and pedestrians (n = 1,041) (Figure 3). The “others” category included vehicles such as vans, *kuliglig*, bicycles, and jeepneys, which were combined due to small individual frequencies.

Risky Driving Behaviors

Among work-related TVC cases, 709 patients (4.59%) had consumed alcohol prior to the crash, while 159 patients (1.03%) reported sleep-related factors as a risk behavior (Table 1).

Safety Equipment Use

A majority of patients (70.90%) were not using any safety equipment at the time of the crash. Only 7.46% reported using protective devices such as airbags, helmets, seatbelts,

or child restraint seats. Helmet use accounted for 6.69% of total cases, making it the most frequently reported safety equipment (Table 2).

Nature of Injuries

The most commonly sustained injury was abrasion (n = 9,016), followed by multiple injuries (n = 8,288) and open wounds (n = 4,090). Closed fractures were the least frequently reported injury type (n = 1,461) (Figure 4).

Logistic Regression Analysis

Logistic regression analyses were conducted within the work-related TVC subset of the ONEISS database. Dependent variables included patient death and specific injury types. Independent variables included risky driving behaviors, safety equipment use, vehicle type, and age. Forward selection was applied, with a significance level for entry set at $p < 0.05$.

Table 1. Risky Driving Behaviors of Work-Related Injuries among Transport/Vehicular Crash (TVC) Patients from 2010 to 2020 (N = 15,451)

Risk Factor	Frequency	Percent
<i>Alcohol Intake</i>	709	4.589
<i>Sleep</i>	159	1.029
<i>Smoking</i>	16	0.104
<i>Mobile Phone Use</i>	20	0.129

Table 2. Safe Driving Behaviors of Work-Related Injuries among Transport/Vehicular Crash (TVC) Patients from 2010 to 2020 (N = 15,451)

Safety Gadget	Frequency	Percent
<i>No Safety Gadgets at all</i>	10,954	70.895
<i>Airbag</i>	19	0.123
<i>Helmet</i>	1,034	6.692
<i>Seatbelt</i>	1	0.006
<i>Child Restraint Seat</i>	98	0.634

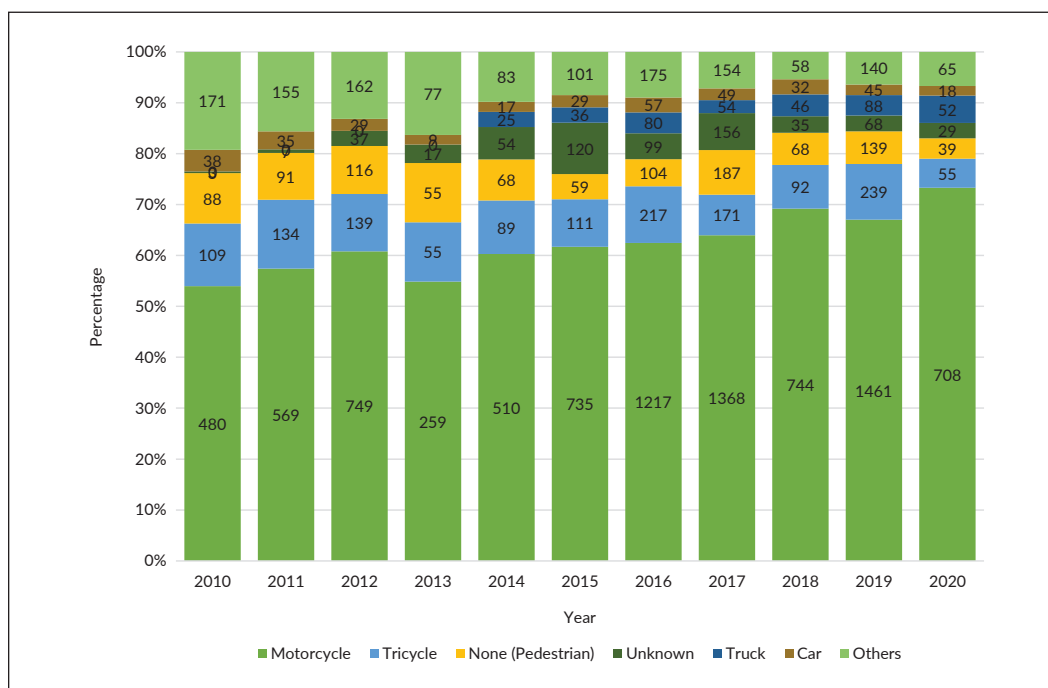


Figure 3. Proportional Distribution of Vehicle Types of Work-related Injuries among TVC Patients from 2010 to 2020.

Model for Patient Death

A total of 10,970 cases were included in the mortality model. The Nagelkerke R^2 value indicated that the model explained 4.7% of the variance in patient death.

Motorcycle involvement was associated with a significantly lower odds of death (OR = 0.307). In contrast, each one-year increase in age was associated with a 2.3% increase in the odds of death (OR = 1.023) (Table 3).

Model for Multiple Injuries

A total of 14,237 cases were analyzed. The Nagelkerke R^2 value was 1.3%, indicating limited explanatory power.

Alcohol intake (OR = 1.867), sleep-related factors (OR = 1.524), and motorcycle involvement (OR = 1.257) were associated with increased odds of sustaining multiple injuries. In contrast, involvement of cars (OR = 0.767) and jeepneys (OR = 0.463) was associated with decreased odds of multiple injuries (Table 4).

Table 3. Logistic Regression Analysis on Patient Deaths of TVC victims from 2010 to 2020

Variable	Parameter Estimate	Standard Error	p-value	Odds Ratio	95% CI for OR	
					Lower	Upper
Motorcycle	-1.182	0.198	0.000	0.307	0.208	0.452
Age in Years	0.023	0.006	0.000	1.023	1.011	1.035
Constant	-4.836	0.280	0.000	0.008		

Table 4. Logistic Regression Analysis on Multiple Injuries of TVC patients from 2010 to 2020

Variable	Parameter Estimate	Standard Error	p-value	Odds Ratio	95% CI for OR	
					Lower	Upper
Alcohol Intake	0.625	0.087	0.000	1.867	1.576	2.213
Sleep	0.421	0.178	0.018	1.524	1.076	2.158
Car	-0.265	0.110	0.016	0.767	0.619	0.951
Jeep	-0.771	0.192	0.000	0.463	0.318	0.674
Motorcycle	0.229	0.036	0.000	1.257	1.171	1.349
Constant	0.063	0.029	0.032	1.065		

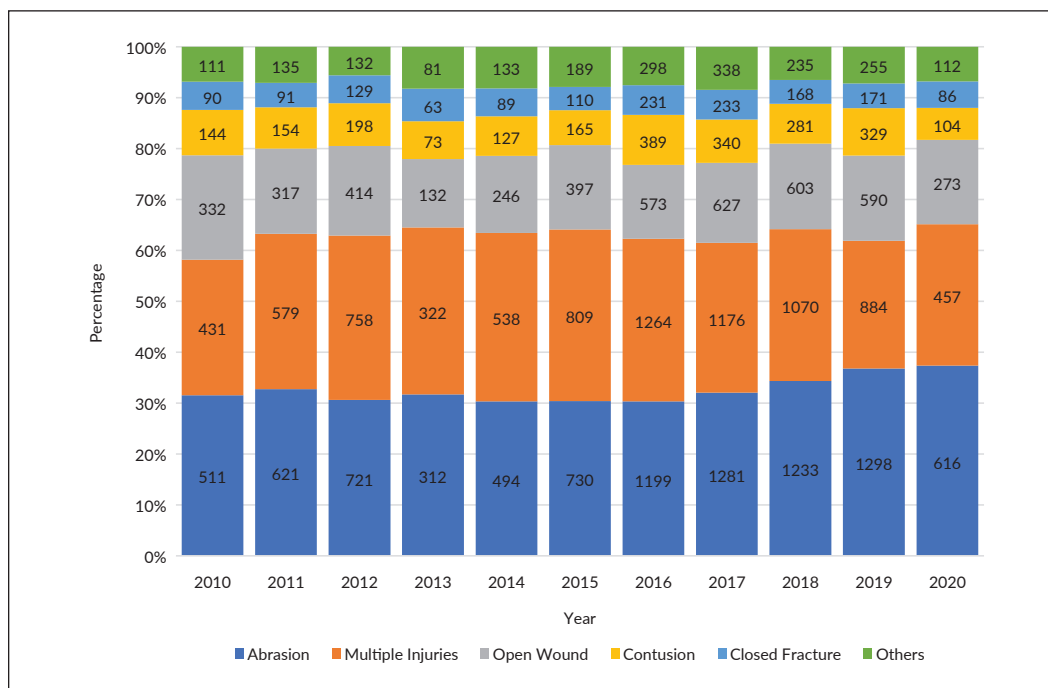


Figure 4. Proportional Distribution of Work-related Injuries among TVC patients from 2010 to 2020.

Model for Abrasion

A total of 10,971 cases were included in the abrasion model. The Nagelkerke R^2 value was 3.6%.

Alcohol intake (OR = 1.540), sleep-related factors (OR = 1.597), helmet use (OR = 1.381), and involvement of bicycles (OR = 1.624), motorcycles (OR = 1.930), tricycles (OR = 1.220), and trucks (OR = 1.294) were associated with increased odds of sustaining abrasions. Conversely, increasing age was associated with slightly decreased odds of abrasion (OR = 0.993 per year) (Table 5).

Model for Avulsion

A total of 10,971 cases were analyzed, with a Nagelkerke R^2 value of 1.2%.

Alcohol intake was associated with increased odds of avulsion injuries (OR = 1.683). Helmet use (OR = 0.657) and involvement of cars (OR = 0.536), jeepneys (OR = 0.390), motorcycles (OR = 0.593), and tricycles (OR = 0.703) were associated with decreased odds of avulsion (Table 6).

Model for Burn Injury

Using 10,971 cases, the burn injury model had a Nagelkerke R^2 value of 0.6%. Motorcycle involvement was associated with increased odds of burn injuries (OR = 1.830) (Table 6).

Model for Concussion

The concussion model included the same 10,971 cases and explained 0.7% of the variance. Airbag deployment (OR = 6.909), car involvement (OR = 2.303), and increasing age (OR = 1.009 per year) were associated with increased odds of concussion (Table 6).

Model for Contusion

A total of 10,971 cases were included, with a Nagelkerke R^2 value of 1.9%.

Mobile phone use (OR = 5.160), involvement of buses (OR = 2.087), cars (OR = 1.753), pedestrians (OR = 1.928), tricycles (OR = 1.355), vans (OR = 2.286), and increasing age

(OR = 1.008 per year) were associated with increased odds of contusion (Table 6).

DISCUSSION

Work-related traffic accidents are unintentional events that result in injury to a vocational driver or rider while operating a vehicle in the course of work.¹⁰ Road-related occupational injuries have been documented as leading causes of work-related deaths in the European Union (EU), United States (US), and Australia.^{14,15} According to the most recent National Census of Fatal Occupational Injuries (CFOI) of the Bureau of Labor Statistics in the US, transportation incidents accounted for 37.3% of the 4,764 reported fatal occupational injuries.¹⁶ In Australia, 72% of occupational road accidents resulted in fatal injuries.¹⁷

In the Philippines, the Philippine Statistics Authority reports occupational injuries and diseases. The 2017/2018 Integrated Survey on Labor and Employment (ISLE) showed that 50.8% of reported occupational injuries involved superficial and open wounds, most commonly due to striking against or being struck by objects. A total of 1,607 cases (3.5% of 46,283 occupational injuries) were recorded in the transportation and storage sector. Notably, commuting accidents were reported across all major industry groups.¹⁸ This finding is consistent with Byler et al., who demonstrated that work-related road crashes are not exclusive to the transport sector.¹⁹ However, detailed data on the causes and nature of occupational road injuries remain limited.

This study provides an overview of work-related road traffic crash trends in the Philippines from 2010 to 2020 and examines how selected variables influence injury outcomes. Work-related TVCs and associated deaths generally increased from 2010 to 2019, with a marked decline in 2020 coinciding with COVID-19 mobility restrictions. Similar reductions in road traffic volume and crash-related fatalities during the pandemic were reported in 32 of 36 countries.²⁰

The present study found a predominance of male involvement in work-related TVCs, with approximately four times more males than females affected. This aligns with

Table 5. Logistic Regression Analysis on Abrasion of TVC patients from 2010 to 2020

Variable	Parameter Estimate	Standard Error	p-value	Odds Ratio	95% CI for OR	
					Lower	Upper
Alcohol Intake	0.432	0.111	0.000	1.541	1.240	1.915
Sleep	0.468	0.221	0.034	1.597	1.035	2.465
Helmet Use	0.322	0.093	0.001	1.381	1.151	1.656
Bicycle	0.485	0.176	0.006	1.624	1.151	2.292
Motorcycle	0.658	0.049	0.000	1.930	1.752	2.126
Tricycle	0.199	0.075	0.008	1.220	1.053	1.413
Truck	0.257	0.111	0.020	1.294	1.041	1.608
Age in Years	-0.007	0.001	0.000	0.993	0.990	0.996
Constant	0.149	0.066	0.024	1.161		

Table 6. Logistic Regression Analysis on Injuries of TVC patients from 2010 to 2020

Variables	Parameter Estimate	Standard Error	p-value	Odds Ratio	95% CI for OR	
					Lower	Upper
Avulsion						
Alcohol Intake	0.521	0.170	0.002	1.683	1.206	2.349
Helmet Use	-0.419	0.210	0.046	0.657	0.435	0.993
Car	-0.624	0.283	0.028	0.536	0.307	0.933
Jeep	-0.941	0.462	0.041	0.390	0.158	0.964
Motorcycle	-0.523	0.087	0.000	0.593	0.500	0.703
Tricycle	-0.352	0.140	0.012	0.703	0.535	0.925
Constant	-2.263	0.069	0.000	0.104		
Burns						
Motorcycle	0.604	0.277	0.029	1.830	1.063	3.149
Constant	-5.422	0.243	0.000	0.004		
Concussion						
Airbag	1.933	0.897	0.031	6.909	1.190	40.110
Car	0.834	0.242	0.001	2.303	1.432	3.703
Age in Years	0.009	0.004	0.014	1.009	1.002	1.016
Constant	-3.651	0.142	0.000	0.026		
Contusion						
Mobile Phone Use	1.640	0.558	0.003	5.157	1.727	15.402
Bus	0.736	0.249	0.003	2.087	1.282	3.397
Car	0.561	0.154	0.000	1.753	1.295	2.372
No vehicle (Pedestrians)	0.657	0.093	0.000	1.928	1.607	2.314
Tricycle	0.304	0.087	0.000	1.355	1.143	1.606
Van	0.827	0.152	0.000	2.286	1.698	3.078
Age in Years	0.008	0.002	0.000	1.008	1.004	1.012
Constant	-2.138	0.073	0.000	0.118		

global data indicating that 73% of road traffic fatalities occur among males, particularly those aged 25 years and older.³ Comparable patterns have been reported in South Africa, Trinidad and Tobago, and Australia.²¹⁻²³ In the Philippine context, where males are often primary income earners, the socioeconomic consequences of road crash fatalities may disproportionately affect surviving family members.^{21,24}

Regarding injury patterns, studies from developing countries have identified skeletal fractures, neurologic injuries, and soft tissue injuries as common outcomes of work-related road crashes.²⁵⁻²⁷ Consistent with these findings, abrasions, multiple injuries, and open wounds were the most frequently reported injuries in this study. Superficial injuries such as abrasions generally require minor treatment and are often classified as non-fatal injuries.²⁸ This may partly explain the relatively low mortality proportion despite increasing case numbers.

Motorcycles were the most frequently involved vehicle type, followed by tricycles. In contrast, studies from developed countries report cars as the predominant vehicle involved in occupational crashes.²⁹ Differences in vehicle preference between high-income and low- and middle-income countries

likely explain this variation. In the Philippines and other Southeast Asian countries, motorcycles are widely used due to lower purchase and maintenance costs and ease of mobility.^{30,31}

Motorcycle involvement was associated with increased odds of multiple injuries (OR = 1.257) and abrasions (OR = 1.930). Tricycle involvement was also associated with increased odds of abrasions and open wounds. These findings are consistent with evidence from Pakistan showing that motorcycle-related crashes frequently result in non-fatal injuries among workers.³² Heavy vehicles such as trucks were associated with increased odds of more severe injuries, including open and closed fractures.

Interestingly, motorcycle involvement was associated with lower odds of death (OR = 0.307). Although motorcycles are frequently involved in crashes, this finding may reflect differences in crash dynamics, exposure patterns, or injury severity among hospital-reported cases. Previous studies in Malaysia and West Africa have shown high fatality burdens associated with motorcycle crashes.³³⁻³⁵ Multiple injuries are known predictors of higher injury severity scores and mortality risk.³⁶

Risky driving behaviors were likely underreported in ONEISS; nevertheless, alcohol use was the most frequently recorded risk factor (4.59%), followed by sleep-related factors. Alcohol and sleep deprivation significantly increased the odds of multiple injuries and abrasions. Alcohol use was additionally associated with increased odds of avulsion and open wounds. These findings align with literature identifying alcohol consumption, fatigue, and prolonged work hours as major contributors to both fatal and non-fatal road injuries.³⁷⁻⁴⁰

Despite the enactment of the Anti-Drunk and Drugged Driving Act of 2013, alcohol-related crashes remain prevalent in the Philippines.^{41,42} Alcohol use may also predispose drivers to other risky behaviors, including speeding and non-compliance with safety regulations.³¹

A concerning finding is that 70.90% of victims were not using safety equipment at the time of the crash. Helmet use was relatively low. While helmet use was associated with reduced odds of avulsion and open wounds, it was associated with increased odds of minor injuries such as abrasions and closed fractures. This likely reflects survivorship and injury distribution patterns rather than causal harm. Helmets are primarily designed to prevent traumatic brain and cervical spine injuries, not extremity injuries, which may explain these findings.^{43,44}

The mean age of patients was 34.98 years, corresponding to the most economically productive age group.²² Increasing age was associated with higher odds of death and certain injury types. Age-related physiologic changes—including delayed healing, reduced visual acuity, slower reaction times, and decreased muscle strength—may contribute to increased vulnerability.⁴⁵

Workplace conditions may further contribute to work-related road crash risk. Studies in the Philippines have documented extended working hours among drivers, often exceeding recommended international standards.^{44,46} Prolonged work hours and insufficient rest are associated with fatigue, stress, and impaired driving performance.^{39,40,47} Commission-based wage systems may incentivize longer working hours and risky driving behaviors such as speeding.⁴² Competition for passengers may also contribute to unsafe driving practices.⁴⁸

ONEISS serves as the national trauma registry; however, fewer than half of eligible hospitals consistently report cases. Underreporting, missing data, and variability in reporting practices may limit generalizability. Strengthening standardized reporting, harmonizing data systems, and ensuring minimum data requirements are essential to improve surveillance quality.

Despite these limitations, the 15,451 analyzed cases represent a substantial dataset and provide valuable evidence to inform occupational safety and road safety policy development in the Philippines.

CONCLUSION

Data on work-related transport and vehicular crashes (TVCs) in the Philippines remain limited. This study contributes to the existing body of knowledge by examining work-related TVCs using national surveillance data from 2010 to 2020. It provides a comprehensive overview of occupational road traffic crash trends in the country and identifies factors associated with specific injury outcomes and mortality.

The findings highlight the substantial burden of work-related road injuries, particularly among motorcycle users and economically productive age groups. Risky driving behaviors and limited use of safety equipment were also shown to influence injury patterns. The evidence generated from this study may serve as a basis for strengthening occupational road safety policies, improving surveillance systems, and guiding targeted prevention strategies in the Philippines.

Occupational road crashes remain an underrecognized public health and labor issue in the Philippines. This study represents an important step toward documenting their burden and advocating for evidence-based prevention strategies aimed at reducing work-related transport and vehicular injuries.

Recommendations

Based on the findings of this study, the following actionable strategies are recommended:

Motorcycle-specific Road Safety Measures

Motorcycles were the most common vehicle type involved in work-related crashes and were significantly associated with multiple injuries and certain injury types. The establishment and strict enforcement of dedicated motorcycle lanes along major roads should be strengthened. Infrastructure planning should incorporate motorcycle safety considerations, particularly in high-volume urban areas.

Strengthened Enforcement of Risk-Reduction Policies

Alcohol consumption, sleep-related impairment, and low helmet use were among the most frequently identified risk factors. Strengthening information and enforcement campaigns by the Land Transportation Office is recommended. Driver's license renewal policies may incorporate 373737 consideration of traffic violations and compliance history.

Multi-sectoral collaboration among national and local government units, civil society organizations, academic institutions, and professional bodies is essential to promote a sustained culture of road safety among drivers and employees who use roads for work.

Occupational Road Safety Integration

Achieving road safety requires coordinated efforts among employers, employees, and government agencies. Road safety education programs should be integrated into

workplace occupational safety initiatives. Accreditation and certification systems for occupational drivers may help ensure professionalism, safe driving practices, and road courtesy within the transport sector.

Furthermore, commuting accidents should be formally incorporated into Occupational Safety and Health (OSH) reporting mandates to improve surveillance and accountability for work-related road injuries.

Statement of Authorship

The author certified fulfillment of ICMJE authorship criteria.

Author Disclosure

The author declared no conflicts of interest.

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