Association of age between driving license and two-wheeler accidents in Karachi, Pakistan

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ABSTRACT:
Objective: To document the frequency of motorbike accidents among licensed and unlicensed two-wheeler rider in relation to the age of two-wheeler rider.
Methodology: This retrospective study was conducted in Karachi, Pakistan. Data were collected from three major medico-legal centers in public sector hospitals: JPMC (Jinnah Postgraduate Medical Centre), CHK (Dr. Ruth K. M. Pfau Civil Hospital), and Abbasi Shaheed Hospital over a five-year period (2018-2022). Ethical approval and consent were obtained from the Police Surgeon, data privacy and confidentiality was ensured. 11,444 two-wheeler accidents were included. The age of the injured rider and whether they had a valid driver's license were variables of interest. Version 23.0 of the Statistical Package for Social Sciences (SPSS) was used to conduct the statistical analysis.
Results: showed that young people and young adults are disproportionately ride two-wheeler without driving licenses and are responsible for the bulk of two-wheeler accidents in Karachi. Poor compliance in the 19-29 age group and the lack of licensing among minors (less than 18 years old) point to structural issues with enforcement and regulation. We found burden of accidents comparatively smaller for older drivers.
Conclusion: Two-wheeler accidents is a major public health issue. As major burden, of two-wheeler accidents is associated with unlicensed rider and younger age, strict enforcement of licensing regulations and targeted awareness campaign for teenagers and young adults are needed to reduce the burden of two-wheeler accidents in Karachi

Key words: Road traffic accidents, Two-wheeler, Age, Driving license,

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Introduction:

Globally, road traffic crashes result in a tragic loss of approximately 1.3 million lives each year. Additional 20 to 50 million individuals sustain non-fatal injuries, often leading to long-term disabilities[1]. The World Health Organization (WHO) has reported that road traffic accidents ranked as the 10th leading cause of death in 2016, with a projected rise to the 8th position by 2030[2]. Pakistan continues to grapple with significant challenges in addressing this public health issue[3]. Road traffic accidents have a major influence on injury-related disabilities and fatalities, particularly in middle and low socio-economic countries, with contributing factors to the heightened occurrence of road traffic accidents that include poor road conditions, heavy traffic patterns, wide spread use of motorcycles as a mode of transportation, amongst other vehicles[4]. Motorcycle injuries are a public health problem. Morbidity and mortality due to motorcycle accidents are still becoming a major problem that needs to be solved. Globally, motorcycle fatalities account for 28% of all road traffic deaths with the effects of motorcycle injuries in low- and middle-income countries (LMICs) being twice as high as those in high-income countries.[5]

Motorcycles offer a fast, cost-effective, and fuel-efficient mode of transportation, making them amongst the widely used vehicles in developing countries. Their affordability and easy availability make motorcycles accessible to many. However, individuals are known to operate these vehicles without adequate training or a valid driving license, increasing the risk of accidents.[6] Over the last decade, Pakistan has witnessed a substantial increase (268%) in the registered motorized vehicles, especially in the motorcycles (613%), and according to 2018 statistics, motorcycles constitute nearly 74% of the total registered vehicles in Pakistan6. Motorization in Asian countries has been proliferating, and the motorcycle is the dominating transportation mode.[7] In Pakistan due to rapid motorization trends there is an upsurge in traffic violations, encroachments on roads, and a lack of comprehensive road safety programs, leading to higher rates of accidents, which are becoming a major public health concern in the country.[8]

Youth represent the population most at risk for unsafe driving behaviors, often driven by sensation-seeking tendencies, such as engaging in reckless motorcycle riding, which poses dangers to themselves and others. Sensation seeking, amiability and impatience are personality attitudes that may lead to risky driving, particularly for young riders.[7] Illegal motorcycle riding among teenagers often results in

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crashes and disastrous consequences; however, it is rampant in many low and middle-income countries.[9] Despite some research conducted in various regions of Pakistan, there remains a space in data pertaining to the distribution, causes, and burden of disability associated with road traffic accidents.[10] Particularly, the increased rates of mortality and disability in motorbike riders, with social and financial loads being placed upon their families.[5] Underage driving is often motivated by adolescents' desire for independence and adventure, further influenced by peer pressure. However, the specific contribution of underage drivers to the crash burden in low- and middle-income countries remains unclear.[11]

Objective:

To document the frequency of motorbike accidents among licensed and unlicensed two-wheeler rider in relation to the age of two-wheeler rider.

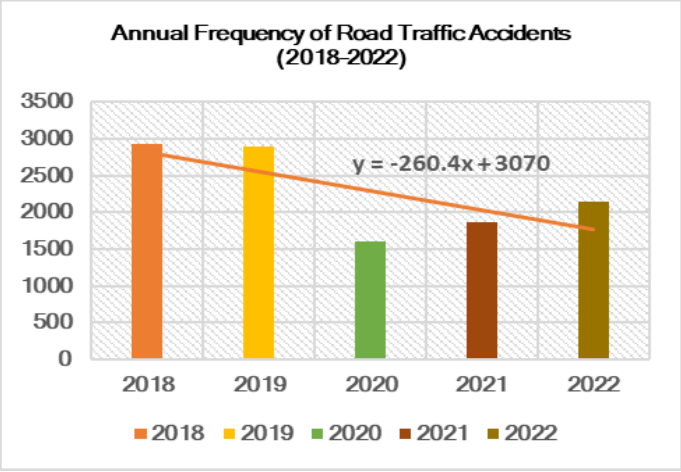
Methodology:

This retrospective study was conducted within the city of Karachi, Pakistan. Data was collected from the three major medico-legal centers in the public sector of Karachi: Jinnah Postgraduate Medical Centre, Dr. Ruth K. M. Pfau Civil Hospital and Abbasi Shaheed Hospital for a period of 5 years during 2018 to 2022. Ethical approval and consent was obtained from the Police Surgeon of Karachi for collecting data for study, ensuring privacy and confidentiality of the two-wheeler riders. The study included a large sample of 11,444 individuals in total, aligning with the approach used in similar studies to be adequate. All the individuals involved in two-wheeler accidents reported to emergency were included in current study. Individuals reported due to any cause other than two-wheelers were excluded from the study. The age of the injured individuals and their possession of a valid driving license were examined as key variables in the study. Results of numerical variables were analyzed with Statistical Package for Social Sciences (SPSS) version 23.0.

Results:

In between 2018 to 2022, 11444 two-wheeler accidents were reported in Karachi, Pakistan the year wise distribution is shown in fig 1. The data collected includes the age of the rider and status of driving license.

Fig No 1: Annual Frequency of Road Traffic Accidents (2018-2022)



The age distribution across two-wheeler accidents discovered that adolescent and those less than 18 years and between 19 to 29 years represented more than 50% (50.9%) of road traffic accidents, during study period. Among this group, the adolescent less than 18 years of age outnumber (25.59%) which apparently look significant, while those aged 19-29 years were 25.4%. The middle-aged riders were least represented (n=1600,13.98%), elder drivers aged 40-49 and >50 years contributed a modest proportion. (n=1874,16.38%; n=2140,18.70% respectively) In other words, young people and teenagers who ride two-wheelers are more likely to be engaged in traffic accidents probably due to their lack of training and uncontrollable temperament.

Table 1: Total road traffic accidents after stratification of age (2018-2022)

Age Groups	Number of Accidents	Percentage
<18 years	2928	25.59
19-29 years	2902	25.36
30-39 years	1600	13.98
40-49 years	1874	16.38
>50 years	2140	18.7

A statistically significant relationship between age groups and license status was found ($\chi^2 = 3688.32$, $p < 0.001$). All adolescent aged less than 18 years, involved in a two-wheeler accident lacked a license, which actually reflects Pakistan's simple legal prohibition on driving. On the other hand, adults were responsible for 76.4% and 66.7% of non-licensed accidents in middle-aged groups 19-29 and 30-39, respectively. In contrast drivers aged 40 years of age or older showed significantly higher compliance; 1145(95.4%) of 40-49-year-old age group and 647(80.9%) of those >50 years respectively involved in accidents had a valid license. According to this pattern, older persons are more likely to drive legally, but younger drivers are disproportionately impacted by license enforcement.

Table No 2: Proportion of Accidents across Age Groups by License Status.

Age Group	Number of accidents with License		Number of accidents without License	
	n	%	n	%
<18 years	0	0	2928	100
19-29 years	686	23.64	2216	76.36
30-39 years	533	33.33	1067	66.67
40-49 years	1788	95.42	86	4.583
>50 years	1731	80.88	409	19.13
Pearson Chi-Square=1593.50; P<0.001				

Discussion:

Motorcycle accidents are a common social health problem in developing countries. The primary objective of this study was to investigate the influence of driving license involvement in accidents among two-wheeler Pakistani riders. In this study we revealed the frequency of road traffic accidents between licensed and unlicensed individuals across different age groups In the <18 age group, where licenses are typically not applicable due to legal age restrictions, a significant number of accidents 1400 were reported among unlicensed individuals. Another study conducted by Khan Ur et al. in Karachi was in agreement with our findings.[11]

In this study we revealed that during 2018 and 2019, total accidents showed a relatively stable trend with 2828 and 2802 accidents respectively. However in 2020, there was a noticeable decrease in accidents to 1400. This decrease could possibly be attributed to the COVID-19 pandemic

world widely. Our findings particularly aligned with a study conducted by Peru, which had similar results finding significant decrease in road traffic accidents during lockdowns.[12] The Government of Pakistan imposed restrictions and lockdowns to control the spread of the virus, following which there was a considerable reduction in vehicular movement, including two-wheelers.[13] These global trends support the notion that restrictions and lockdowns during the pandemic contributed to the reduction in road traffic accidents. There was an upswing in accidents, reaching 1,720 in 2021 and 2,040 in 2022, suggesting a possible return to pre-pandemic traffic levels following the easing of restrictions, a trend that aligns with late-pandemic patterns observed in a related study.[14]

Our research findings shed light on the age demographics that are most vulnerable to road traffic accidents (RTAs). Remarkably the age between 19 and 29 develops as the cohort with the most significant incidence of accidents, constituting an appraised 41.4% of the total accidents. An analogous study conducted within Ethiopia by Oltaye et al. found a similarly high percentage of motorcycle-related accidents, specifically 50.33%, occurring within the economically active age range of 20-29 years, were in covenant to our findings.[15] Study conducted in Karachi as recently as 2022, by Muhammad K. et al, concluded two-thirds of RTA victims were men aged between 18 and 39, revealing a equivalent trend when compared to our study which showed a value of 70.3% in the same age group, supporting a regional uniformity, and supporting the significance of this demographics' burden to road traffic accidents.[10] Increased exposure to motorcycles among this age group is basically due to the affordability and accessibility of motorcycles for middle- and lower-middle-class youth in Pakistan.[16]

The second-highest percentage of accidents is observed in the 30-39 age group, comprising approximately 28.9% of the total accidents. This age group also showed higher accidents in the unlicensed group. Table 2 clearly illustrates that unlicensed drivers are disproportionately represented in younger age groups. For instance, in the 19-29 age group, 69.03% of accidents were caused by unlicensed riders. As age increased, the proportion of unlicensed riders involved in accidents decreased significantly, with only 4.8% of accidents in the 40-49 group involving unlicensed individuals. Though our data suggests that an overall larger proportion of drivers did not possess valid driving licenses, a study conducted by Rana, Asghar, et al. was in contrast to our findings which showed that 67.9% of drivers owned a motorcycle driving license, while only 32.0% did not have a valid driving license.[17] In our study the 40-49 age group accounts for about 10.5% of the total accidents, indicating that this cohort appears to exhibit a relatively safer driving behavior which could potentially be attributed to a combination of driving experience and a sense of responsibility among riders in this age range. Another South Asian study conducted by Miah et al, within motorcyclists in Bangladesh, found a similar statistic to ours where the 40-49 age group accounted for 8.96% of accidents.[18]

Age group >50 showed the lowest percentage of accidents, at approximately 7.0%. older adults generally drive more safely than individuals in other age groups.[19] This trend may be indorsed to older riders' careful driving habits, a more tendency to avoid risky situations, and heightened awareness of their physical and cognitive limitations. Older drivers have been found to self-regulate by limiting exposure to high-risk conditions, such as heavy traffic, night driving, adverse weather, or, which combined with their experience, likely contributes to lesser accidents rates.[20] On the other hand, studies have reported an increasing trend in injuries and fatalities among older motorcyclists. However, this rise has been attributed to the growing number of older individuals engaging in motorcycling rather than an increase in crash likelihood.[21] Importantly, these findings predominantly reflect research in developed countries and may not fully apply to Pakistan, where driving patterns and safety conditions differ. Our study, conducted in Karachi, addresses this gap by examining the unique challenges faced by older motorcyclists in a developing country context.

Conclusion:

Two-wheeler accidents is a major public health issue. As major burden, of two-wheeler accidents is associated with unlicensed rider and younger age, strict enforcement of licensing regulations and targeted awareness campaign for teenagers and young adults are needed to reduce the burden of two-wheeler accidents in Karachi

Limitations:

The limitation of this study: Only typical two wheelers bike accidents were included whereas in real life scenario multiple types of two-wheeler vehicles like chingchi, bike carts are also present on the road. Multiple other factors like road infrastructure, weather conditions and vehicle conditions were not included in this study which can lead to bias in results.

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Authors' Contribution	
Farzana Azam Khan	Conceive idea and research design
Syed Mukkaram Ali	Review of literature
Hafeezul Hassan	Methodology
Sadia Abdul Qayyum	Manuscript draft
Subhan Zahid	Data Collection
Summaiya Syed Tariq	Critical review
Komal Yousuf	Proof reading & final manuscript writing