

An In-Depth Analysis of Road Fatal Crash Patterns and Discussions in Ho Chi Minh City

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Abstract: Although there has been a slight decrease in road traffic crashes, fatalities, and injuries in recent years, HCMC (Ho Chi Minh City) will continue to encounter challenges in mitigating and preventing road crashes. This study analyzes road crash data from the past five years, obtained from the Road-Railway Police Bureau (PC08) and TSB (Traffic Safety Board) in HCMC. This analysis gives us valuable insights into road crash patterns, characteristics, and underlying causes. This comprehensive understanding serves as a scientific foundation for developing cohesive strategies and implementing targeted solutions to address road traffic safety issues more effectively in the future.

Key words: Traffic safety, safety policies, fatal crash patterns.

1. Introduction

Road crashes pose a worldwide challenge, leading to millions of fatalities and injuries annually. As per the WHO (World Health Organization), more than 1.2 million people lose their lives due to road traffic crashes each year, and as many as 50 million others are injured. They cause great damage to people, property, and socio-economy, particularly in low- and middle-income countries, where over 90% of the deaths occur. Annual traffic crashes are estimated to cost the world between 1% and 3% of the GNP (gross national product) [1].

Vietnam is classified as a low-income country by the WHO (790 USD/capita), with the proportion of deaths due to traffic crashes per 100,000 people being 24.5, and annual losses traffic crashes cause accounting for 2.9% of GDP (gross domestic product) [2]. Thus,

traffic crashes affect not only individuals but also the whole society. Nearly 54% of deaths due to traffic crashes are related to pedestrians (23%), bicycles (3%) and motorbikes (28%) [3].

The number of road deaths in HCMC (Ho Chi Minh City) has seen positive changes in recent years. Compared to 2015, it decreased by 10.7% in 2022 in HCMC with the corresponding 703 and 635 [9, 16].

Nevertheless, until now, road crash is still significantly complicated and there has been no research on deep analysis of road traffic crashes patterns and systematic causes especially road fatal crash patterns to understand deeply the trends, characteristics, and causes of road traffic crashes and specific solutions to solve road traffic crashes problems more effectively.

This article's framework will analyze road traffic crash data in the last five years (2018-2022), sourced

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from the Road-Railway Police Bureau in HCMC. Through this analysis, we aim to comprehensively understand the trends, characteristics, and causes underlying road traffic crashes. This comprehensive understanding serves as a scientific foundation for developing cohesive strategies and implementing targeted solutions to address road traffic safety issues more effectively in the future.

From 2010 to 2021, there was a consistent decline in road crash fatalities in HCMC, dropping from 11.8 to 5.2 deaths per 100,000 population. However, there was a notable increase in fatalities from 2021 to 2022, rising to 6.7 deaths per 100,000 population [4-16]. The

upsurge in fatalities in 2022, is likely attributed to the relaxation of mobility restrictions. The number of fatalities in 2022 exceeded the three-year average from 2018 to 2020, indicating a rising trend in crash fatalities. Table 1 provides the population, fatalities, and death rate per 100,000 population, while Fig. 1 illustrates the trend of crash fatalities.

From 2010 to 2022, motorcyclists accounted for the largest proportion of crash fatalities, representing 76.7% of the total deaths (Fig. 2) [4-16]. Conversely, pedestrian crash fatalities decreased during the pandemic but experienced a surge in 2022 coinciding with the relaxation of mobility restrictions.

Table 1 Summary of road fatalities and death per 100,000 population data in HCMC (2010-2022).

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
No. fatalities	877	865	816	774	723	701	804	716	680	606	560	474	630
Population (Mil.)*	7.40	7.61	7.79	7.97	8.14	8.31	8.48	8.65	8.84	9.04	9.23	9.17	9.39
Death per 100,000 population	11.8	11.4	10.5	9.7	8.9	8.4	9.5	8.3	7.7	6.7	6.1	5.2	6.7

* <https://www.gso.gov.vn/>.

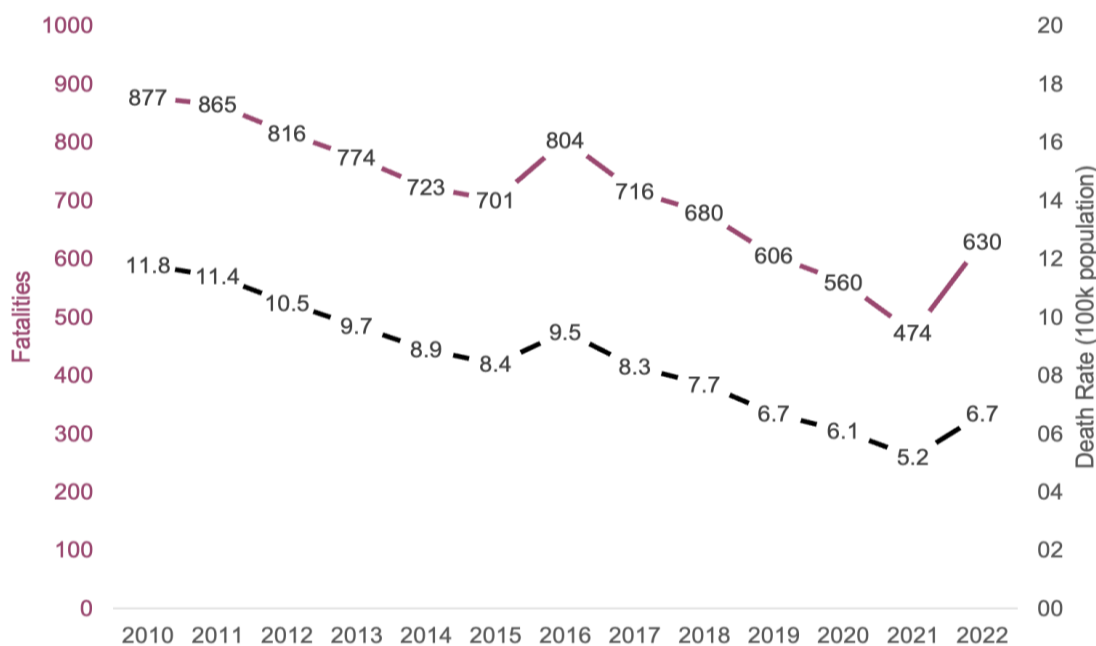


Fig. 1 Fatalities and death rate (2010-2022).

Source: Annual Traffic Safety Report of HCMC Traffic Safety Board, 2010-2022 [4-16].

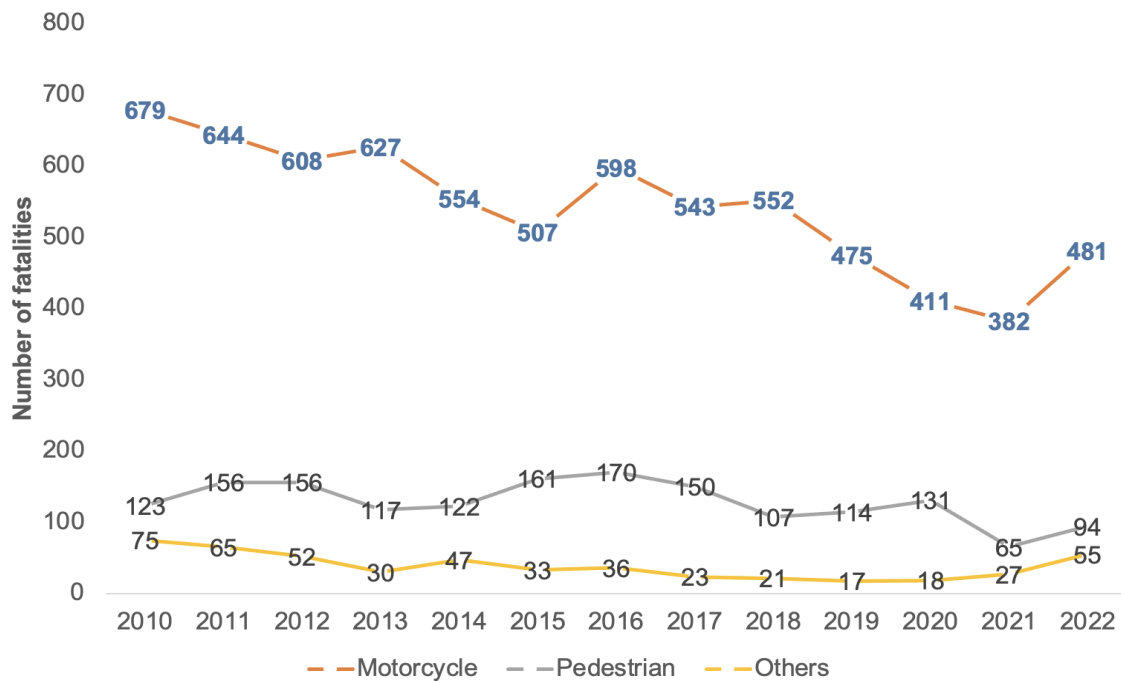


Fig. 2 Death by road user type (2010-2022).

2. Methods of Data Collection & Analysis

An in-depth analysis was conducted on the data sourced from the Road-Railway Police Bureau in HCMC for five years (2018-2022). Information regarding traffic crashes is gathered by form 45/GT under Decision 1093/2000/QD-BCA and form 02/TNDB issued under Circular 58/2009/TT-BCA replacing form 45/GT from December 12, 2009. These two forms (45/GT; 02/TNDB) contain a comprehensive range of approximately 60 data points concerning crashes. Nevertheless, due to various factors such as delays in crash reporting to the traffic police or alterations at the accident scene, the amount of reliable information obtained was reduced to around 17 data points. This article focuses on analyzing the dataset based on these 17 items and discussions (Fig. 3).

3. Results

In 5 years (2018-2022), there were 3,945 road fatal crashes, and 2,950 deaths in the city. Their patterns of distribution by time, location, age, gender, etc. are

presented below.

3.1 Fatal Crashes Distribution by Time

The number of deaths tends to increase slightly during festivals, traditional New Year, and weekends. (Figs. 4 and 5). The number of deaths occurs mainly at off-peak hours. They occurred mainly from 2 pm to 5 pm, and from 8 pm to 1 am the next morning, of which the highest time was at 10 pm-11 pm hours (9.8%) (Fig. 6).

3.2 Fatalities Distribution by Subject Leading to Crashes

Fig. 7 shows that the age group causing the highest fatalities in the city is the 31-40-year-old group (20.2%), followed by the 19-24-year-old group, accounting for 14.4%. This is an immature age, very eager, especially, easily stimulated by alcohol. Besides that, 16-18-year-olds account for a significant proportion (nearly 5.2%). This is a group of subjects who are in high school and have not been allowed to use motorbikes over 50 cm³. Traffic safety policy should pay more attention to this target group.

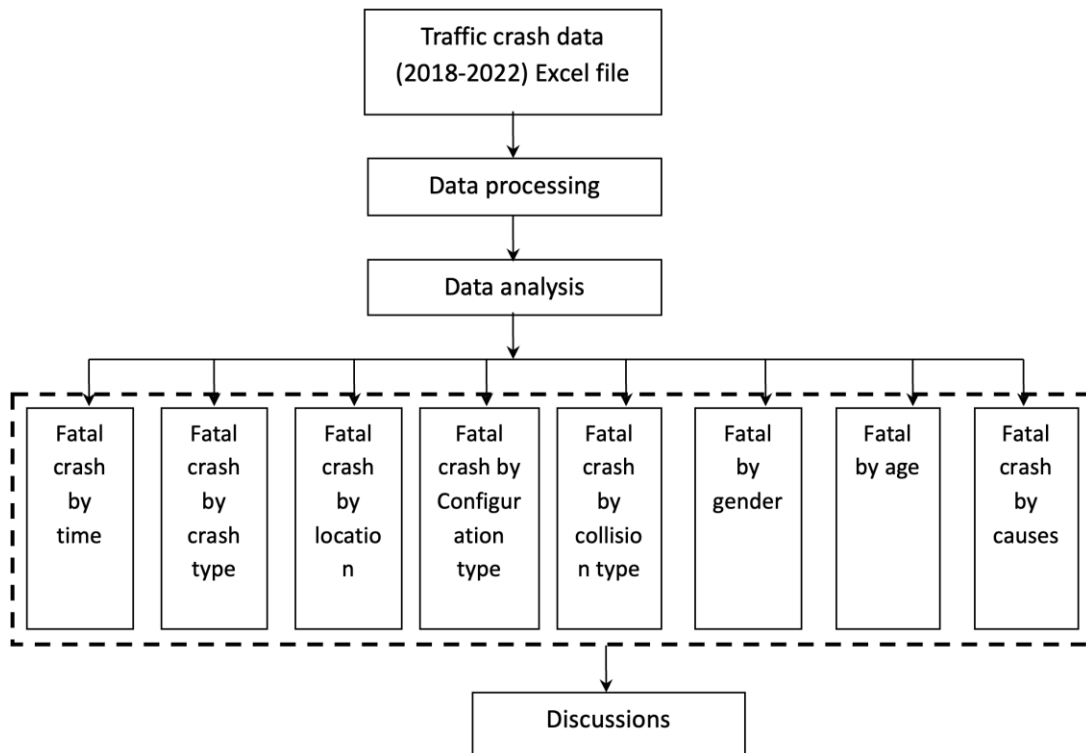


Fig. 3 Research framework and data analysis.

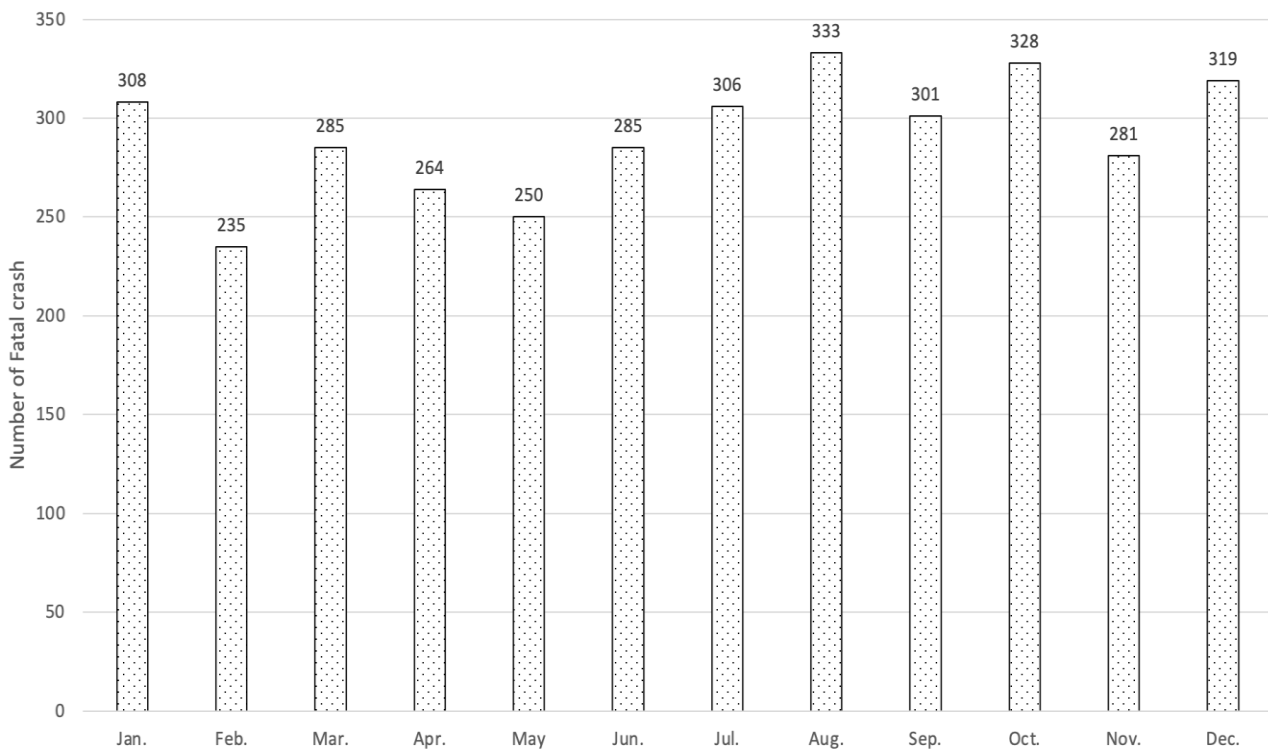


Fig. 4 Fatal crash distribution by month in HCMC.

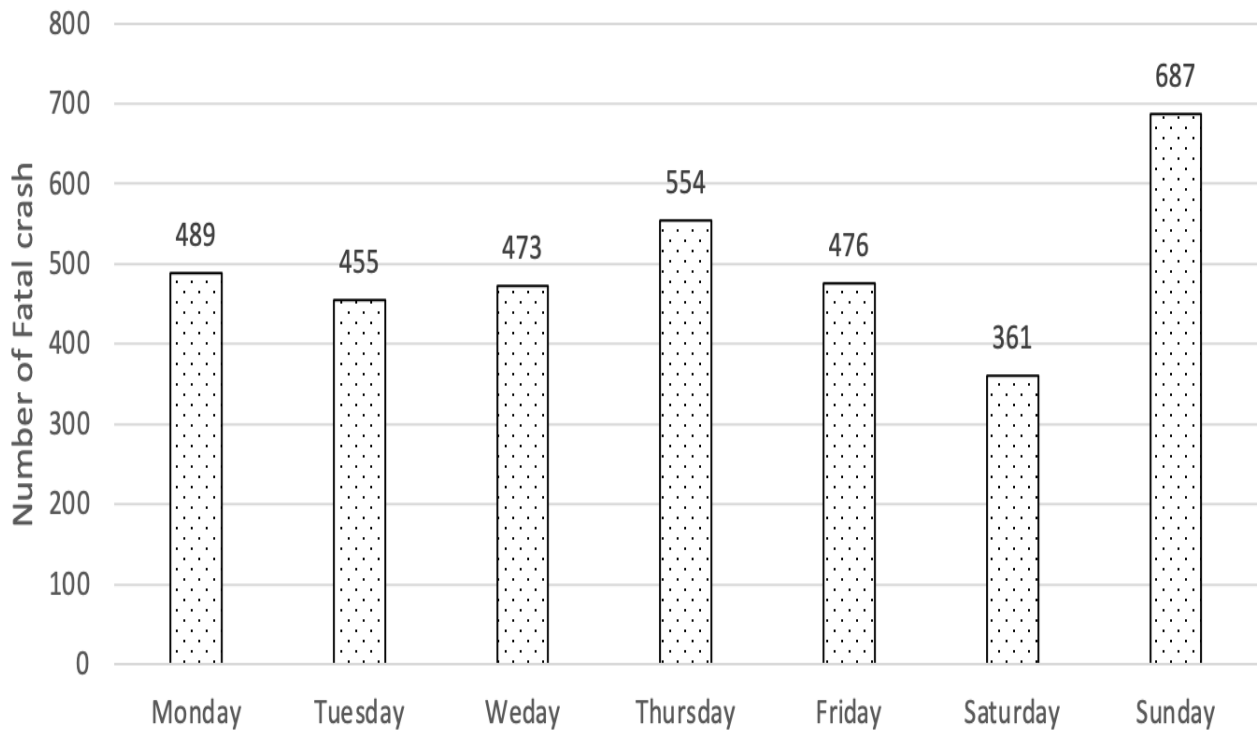


Fig. 5 Fatal crash distribution by day in HCMC.

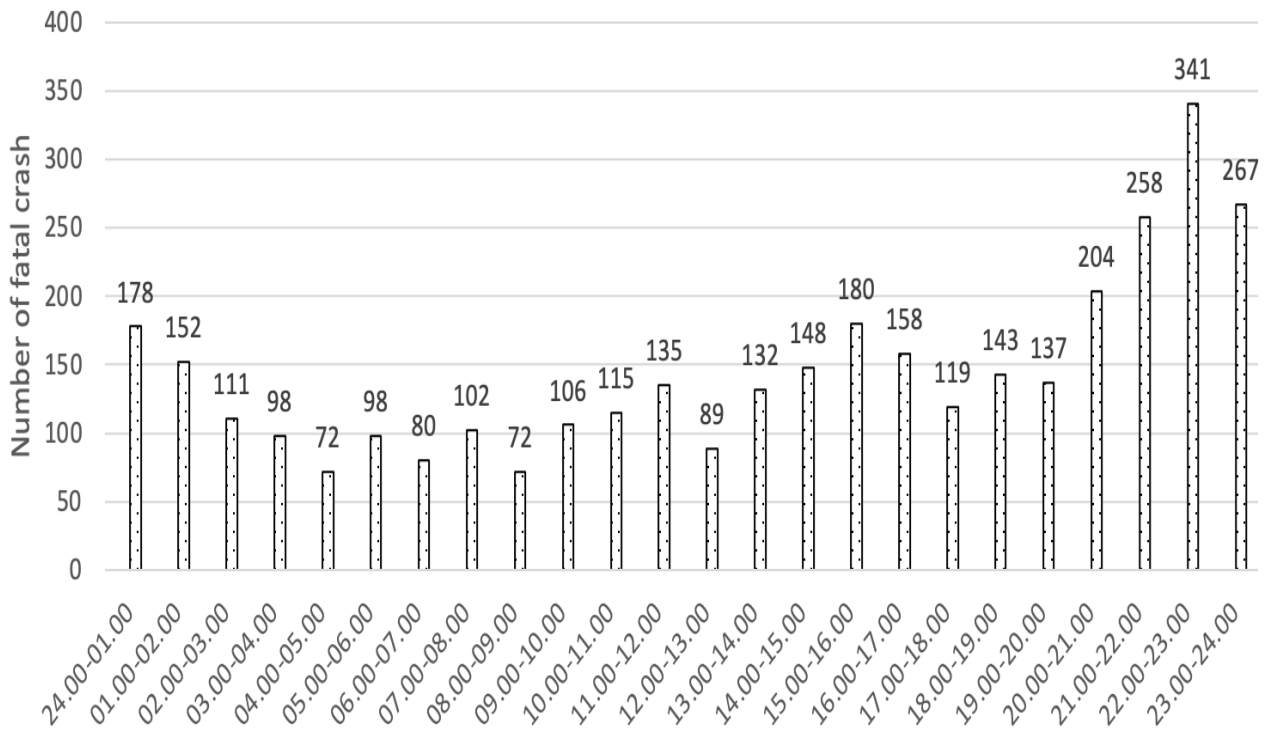


Fig. 6 Fatal crash distribution by hours in HCMC.

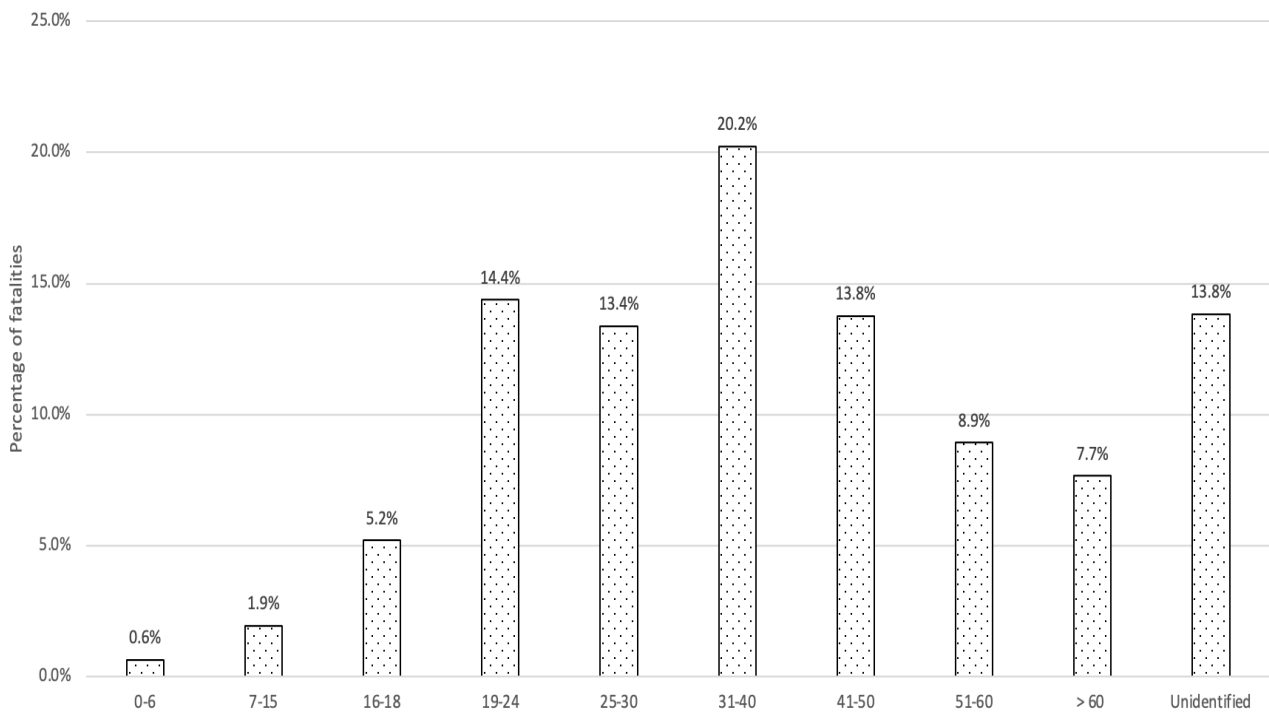


Fig. 7 Fatalities distribution by age in HCMC.

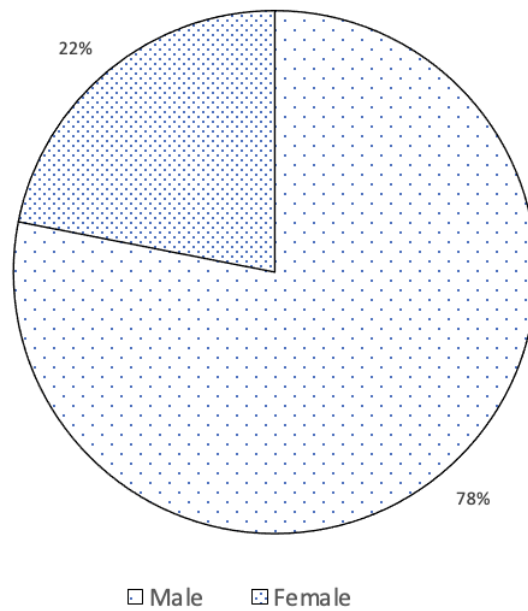


Fig. 8 Fatalities distribution by gender in HCMC.

Fig. 8 shows that the majority of fatalities victims are men (78%). This is easy to learn deeply as they usually are drivers and involve most trips with their family.

The main group of vehicles causing fatalities are collisions with 2 or more than two vehicles, accounting for the largest proportion (67.7%), followed by single vehicles (21.3%), and pedestrians (8.7%) (Fig. 9).

Fig. 10 shows the distribution of fatalities by configuration type. Across the city, the most common form is the pair: car-motorcycle (38%), motorcycle-motorcycle (22.6%), motorcycle self-crash (21.8%), and motorcycle-pedestrians (5.3%). Fig. 11 shows that the main causes of fatal crashes are related to drivers (violating safety rules, wrong lane, lack of attention, self-accident,

exceeding the speed limit, ...). Research in many countries shows that many different factors lead to traffic crashes. This data may not reflect the actual situation. For example, in the case that the road maintenance and repair work

is not good, the sign system, and paint lines are not clear, the layout is not reasonable, the road surface does not guarantee grip in the rainy season, etc. accident occurring is often attributed to the cause of the crash.

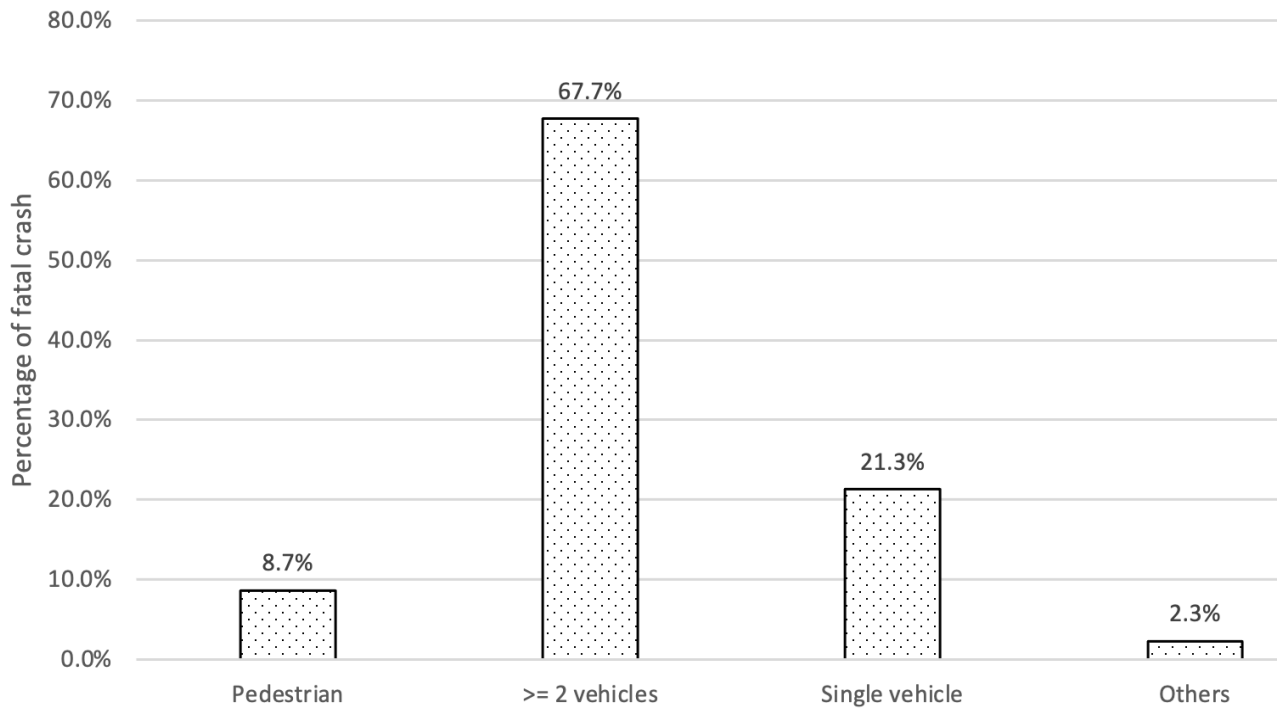


Fig. 9 Fatalities distribution by crash type in HCMC.

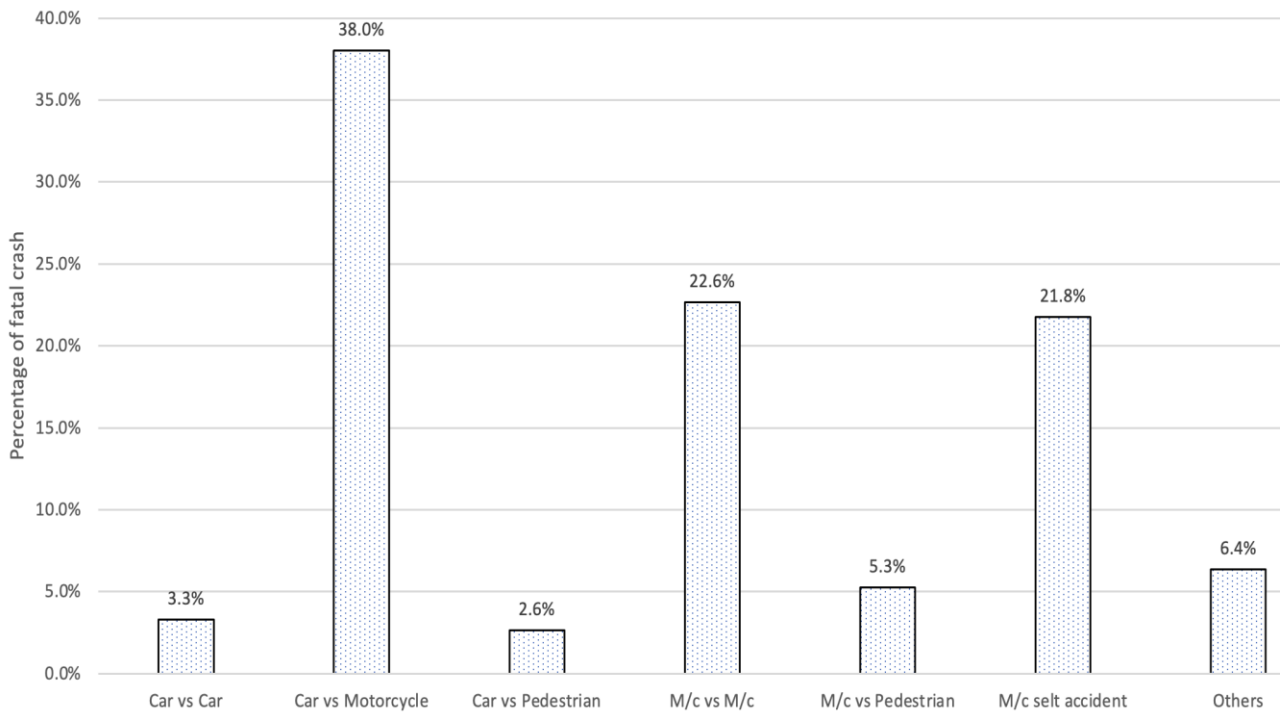


Fig. 10 Fatalities distribution by type of configuration in HCMC.

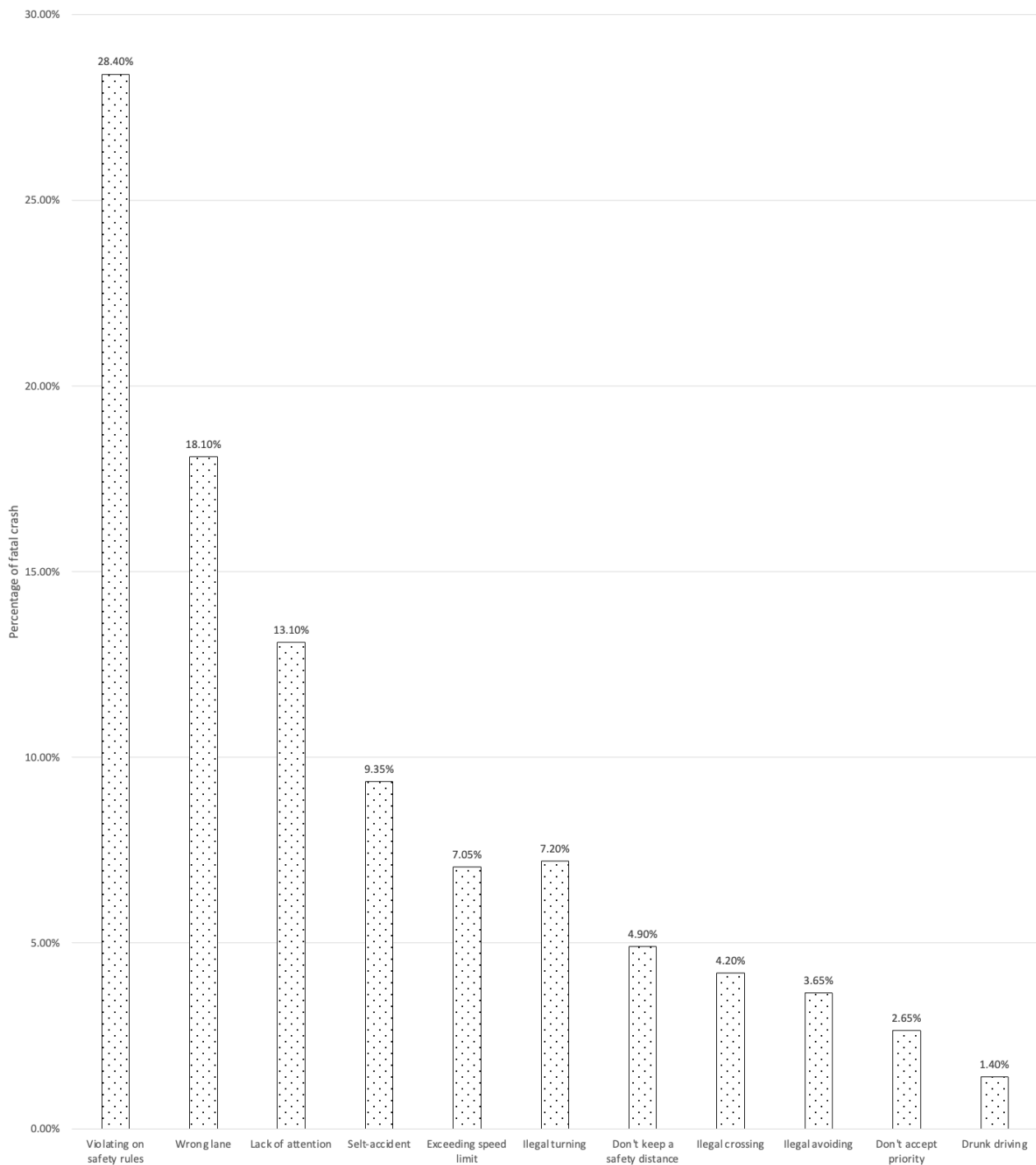


Fig. 11 Fatalities distribution by causes in HCMC.

3.3 Fatal Crash Distribution by Location and Collision Type

Figs. 12 & 13 show that road fatal crash occurring commonly in mid-block taking accounts for 51.2% and

more than 16% of head-on collisions. There is a need for infrastructure improvement such as widened road sections and median installation. Exceeding the speed limit might lead to a fatal road crash on mid-block and intersection as well.

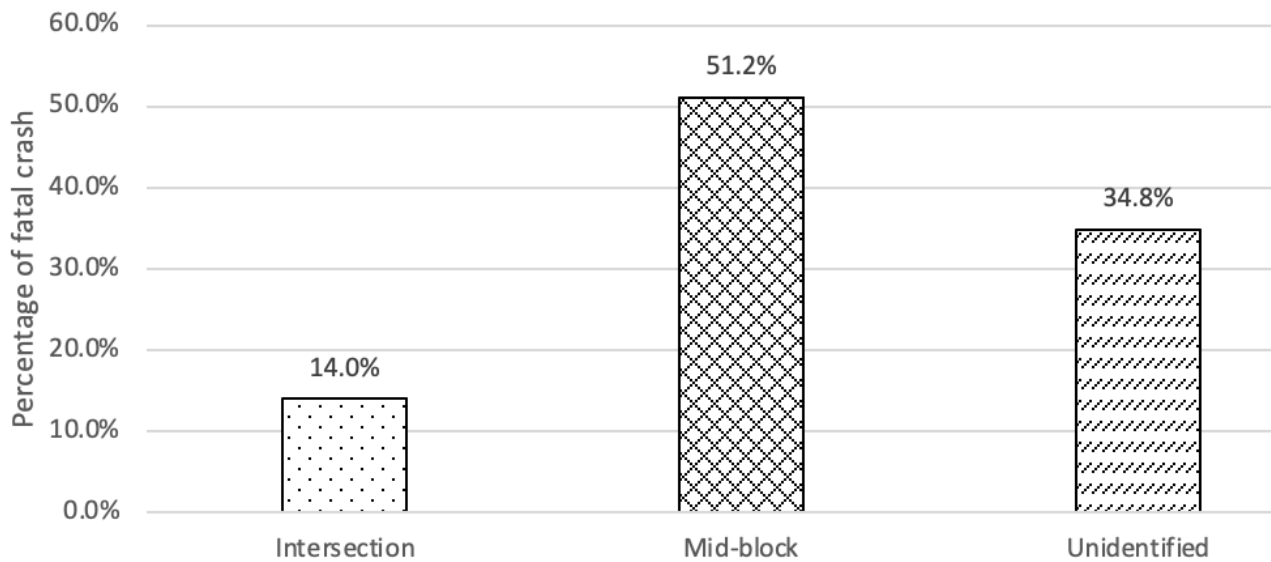


Fig. 12 Fatal crash distribution by location in HCMC.

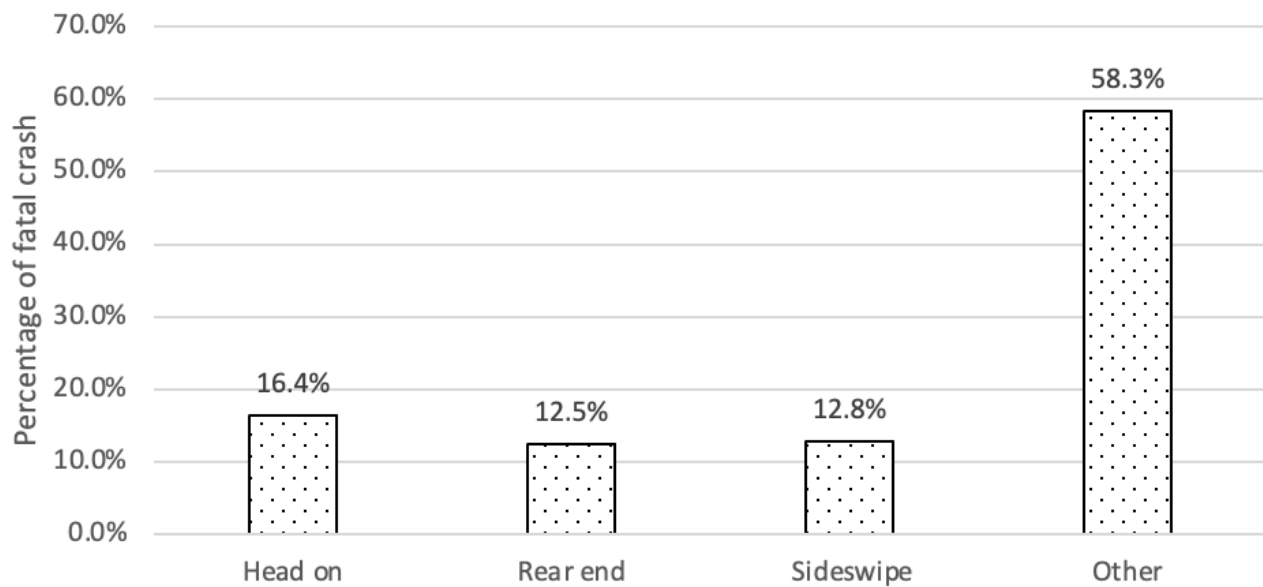


Fig. 13 Fatal crash distribution by collision type in HCMC.

4. Discussions

The interesting analytical results are summarized as follows: (i) the majority of fatal incidents occurred between 10 pm and 11 pm; (ii) men aged 31-40 are the primary demographic affected by accidents, although it is worth mentioning that individuals aged 16-18 also make up a significant portion; (iii) collisions involving two or more vehicles are responsible for the highest proportion of fatalities (67.6%), followed by single-

vehicle accidents (21.3%), and pedestrian incidents (8.7%); (iv) the main causes of traffic accidents include violations of safety regulations, improper lane usage, lack of attention, self-induced accidents, and exceeding the speed limit; (v) fatal crashes commonly occur in mid-block locations, accounting for 51.2%, with head-on collisions representing over 16% of crashes.

Based on the findings of the research, the author suggests several measures for the city to further enhance traffic safety:

(1) Enhance coordination between the media and enforcement agencies to conduct targeted awareness campaigns on traffic safety, particularly focusing on the male demographic aged 31-40 and the 16-18 age group; strengthen enforcement efforts during the hours of 10 pm to 11 pm; consider revising the signal light system to ensure optimal traffic safety, possibly transitioning from flashing yellow lights at night to continuous operation during the day.

(2) Enforce strict penalties for individuals who misuse sidewalks, especially in downtown areas, to create safer conditions for pedestrians.

(3) Investigate and implement solutions, both technically and through stringent penalties, to reduce instances of traffic violations, such as improper lane usage, running red lights, and speeding.

Additionally, the author recommends conducting more comprehensive analytical studies to improve the quality of data collection forms at accident sites. This will help establish a robust dataset and facilitate regular data analysis, ultimately enhancing the effectiveness of the city's traffic safety programs.

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