

# REPORT OF RESEARCH RESULTS

## A. Title :

Data Linkage of Traffic Crash Datasets and Hospital Datasets for Investigating Influential Factors Affecting Injury Severity of Aged Motorcyclists

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## C. Summary:

D. The zero deaths vision of Vision Zero is established in the hope of decreasing the number of deaths and the serious injured. However, in the past, the relevant studies regarding traffic accident injury severity in Taiwan used current definition, death within 24 hours after accidents, of traffic crash datasets proposed by National Police Agency when it comes to injury severity scales. And such scales cannot provide precise information about the modality of serious accidents occurring in Taiwan. Therefore, the injury severity scales will be redefined and the international definition of death, which means a 30-day mortality will be used instead in this study. In 2017, Taiwan officially became an aged society. In addition, the motorcycle accidents caused by the elderly are extremely serious, and the improvement is thus needed. The traffic crash datasets, statistical data of multiple cause of death and the hospitalisation data from 2012 to 2016 are linked in this study. The traffic injury severity scales are divided into four scales, including 30-day mortality, hospitalised, injured and uninjured. Furthermore, the column of multiple cause of death and that of ICD codes are used to analyse the injured body parts. According to the result of initial analysis, aged motorcyclists tend to have more serious injury severity when the features are: age over 85, male, without wearing a helmet, under 0.15 BAC, head-on collisions, flashing traffic signalised intersection, provincial highway and without night lighting. The Logistic Regression Model and Ordered Logit Model are used to analyse if aged motorcyclists are the influential factor in 30-day mortality and injured severity. According to the model results, it is shown that «driving under the influence of alcohol», «running a red light», «failure to yield», «without wearing a helmet» and other problems should be paid more attention to decrease the injury severity of motorcycle accidents. It is necessary to decrease the injury severity of aged motorcyclists and propose relevant improvement strategies, including realising law enforcement on provincial highway every year to deter motorcyclists from riding too fast, conveying the correct concept and way to wear a helmet, preventing people from riding motorcycles after drinking, paying attention to the front of vehicle at night without lighting, etc. It is shown that, for each road type, «improper left turns», «side collisions» and «intersection collisions» shall be paid more attention on signalised intersections, and that «improper lane change» and «head-on collisions» shall be paid more attention on road sections. On

flashing traffic signalised intersections, however, it is important to focus on the education of the right-of-way.

### **E. Aim of Research**

In order to understand and solve the traffic safety problems of the elderly in the ageing society, the subjects of this study are the motorcycle traffic accidents caused by motorcyclists aged 65 and over. The year of research data ranges from 2012 to 2016. Based on the motivation mentioned above, the objectives of this study include:

1. Link the hospital data and traffic crash data of Health and Welfare Data Science Centre, HWDC and conduct the data processing in order to improve the quality of data.
2. Use the multiple causes of death codes to define if the accident victims perished because of the traffic crash; the ICD codes and the external cause codes are used to define if they were hospitalised because of the traffic crash. In addition, the ICD codes and the death cause codes in hospital data are used to understand the specific injured body parts of the accident victim.
3. Use statistical methods to analyse the data and understand deeply the features of aged motorcyclist traffic crash in Taiwan by four domains, including condition of driver, road, environment and traffic crash.
4. According to different road types, the Logistic Regression Model and the Ordered Logit Model are established to analyse the influential factors regarding the injury severity of aged motorcyclist traffic crash.
5. Understand the policies on elderly traffic safety in different countries and take the analytical results of this study into consideration in order to find out the suggestions for improvement of elderly traffic safety in Taiwan.

### **F. Method of Research & Progression**

According to different road types, the Logistic Regression Model and the Ordered Logit Model are established to analyse the influential factors in regard to the injury severity of aged motorcyclist traffic crash.

### **G. Results of Research**

#### **Results of Linkage Analysis of Traffic Crash Datasets and Hospital Datasets Provided by Ministry of Health and Welfare**

1. By comparing the column of «Whether vehicle accidents happened» with the column of « the hospitalisation is because of accidents» generated by the external cause codes and ICD codes in this study, it is discovered that the registered values of external cause codes and ICD codes regarding hospitalisation status of accident victims shall be more precisely defined .

2. The results of injured body part analysis demonstrating multiple injured body parts generated by data of Ministry of Health and Welfare can show more specific injured body parts.
3. There are centenarian errors in the accident data. This problem might result from the fact that the police didn't check promptly the birth year with the accident victims when registering the information and registered their birth year as January 1912.
4. The inadequate preciseness of the column of genders registered in accident data can be corrected by the column of genders that was generated by using identity numbers and data of Ministry of Health and Welfare.
5. The initial analysis shows that motorcycle accidents caused by the elderly shows that age over 85, male, without wearing a helmet, under 0.15 BAC, head-on collisions, flashing traffic signalised intersection, provincial highway and without night lighting tend to have more serious injury severity.

#### **Analysis Results of Influential Factors of Injury Severity for Aged Motorcyclists**

1. By comparing the Logistic Regression Models of 30-day mortality and death occurring within 24-hour of traffic accidents, it is discovered that the model constructed based on the definition of 30-day mortality can highlight more the death severity of traffic accidents cause by aged motorcyclists. Apart from genders, the model of 30-day mortality can also emphasise driver's qualifications, road categories as well as other factors influencing the death of traffic accidents.
2. Decrease the injury severity of aged motorcyclists and propose relevant improvement strategies, including realising law enforcement on provincial highway every year to deter motorcyclists from riding too fast, conveying the correct concept and way to wear a helmet, preventing people from riding motorcycles after drinking, paying attention to the front of vehicle at night without lighting, etc.
3. For each road type, «improper left turns», «side collisions» and «intersection collisions» shall be paid more attention on signalised intersections, and that «improper lane change» and «head-on collisions» shall be strengthened on road sections. On flashing traffic signalised intersections, it is important to focus on the right of way.

#### **H. Future Areas to Take Note of, and Going Forward**

1. After the linkage and problem handling of traffic crash data and statistical data of multiple cause of death, it is discovered that 1,947 cases were categorised as death from traffic accidents. By lack of accident data of

accident victims, it is unable to conduct the linkage, and thus it is impossible to understand the features of accidents. However, there are 9,087 people who didn't have medical records and perished within 24 hours after accidents. Probably, due to the fact that identity numbers were not correct in the accident information, all data couldn't be linked. Therefore, it is recommended to improve the quality of information registration.

2. The restructuring of external cause codes, ICD codes and other columns of hospitalisation data has started since 2016, and it is discovered that response rate has started to decrease since this year. In the future, it is recommended to keep tracking on the existence of such problem to avoid that the features of accident victims who were hospitalised because of accidents cannot be shown.
3. Two columns (accident hour/minute) are not provided in the traffic file data of Ministry of Health and Welfare. For this reason, it is hard to check if accident victims caused two accidents at the same day or the same accident was registered twice during the process of solving registration problems. National Police Agency is recommended to provide relevant columns for the public to conduct data processing in the future.
4. Injured body parts are generated by linking multiple cause of death data and hospitalisation data, and it is impossible to know the injured body parts of accident victims suffering from general damages. It is recommended to improve the column of primary injury in accident reports, and change it into multiple injured body parts instead.
5. According to the existing law of Republic of China (Taiwan), people should not drive after the sobriety test showing BAC over 0.15 mg/L, but the imposition of penalty only occurs when the sobriety test showing BAC over 0.25 mg/L. In fact, the injury severity scale and death occurring within 24 hours or 30-day mortality are more serious for categories except for under 0.15 BAC (mg/L). It might due to the fact that the elderly believed that even the accidents happened, they wouldn't get charged with anything, and they only relied on luck and drove after drinking. Whereas, those who had BAC over 0.15 and under 0.55 were aware that they might get charged with penalty and be very cautious while driving, resulting in lower injury severity compared to other categories. Based on the above-mentioned hypothesis, it is recommended to have downward revision to BAC value for drinking penalty.

## **I. Means of Official Announcement of Research Results**

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