Study on Vietnam Traffic Accident Situation via Data of Health Sector

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Abstract: The traffic accident database is the sole important source outside of traffic police that could help effectively to understand the traffic safety situation. For right usage, this study has clarified its special feature such as better liability, difference of purpose, object and standard. The data of 2009 confirms the efforts to ensure the traffic safety so that the fatalities are under control, but the seriousness of traffic accident is very high. Especially, the study has proposed a methodology to find out the Correction Factor of the number of accident sufferer. Based on the corrected value, it could reconfirm that the number of injured published by traffic police is unrealistically low. It shows the underreporting level is about 63 times. It proved that the corrected data are quite in concordance with a rule from the Vietnamese Injury Pyramid that for each fatality, there are 58 injuries at difference seriousness.

Key Words: traffic accident, health sector, database, correction factor

1. INTRODUCTION

Traffic accident data have great importance in understanding safety situation. In Vietnam as in many countries, the dominant source is the traffic accident database of traffic police who is under the state management of the Ministry of Public Security (MOPS). This database is stipulated official.

Together with this source, there are related databases of health- and insurance sectors, too. It is easy to think that these databases could play a secondary role to provide complement information only, but in fact they have a higher importance: they could provide a different insight into the whole traffic safety circumstance.

Unfortunately, the traffic accident related insurance in Vietnam, though compulsory, but still far to be developed. The database of this sector seems to be in the first developing stage only.
In this context, the database of health sector is the sole important source outside of traffic police that could help effectively to understand the traffic safety situation. Following World Health Organization’s (WHO) regulations (see WHO, 2004), since many years, the traffic accident is considered as one kind of diseases and are classified by using ICD 10 (International Classification of Diseases, version 10). The data are collected and published regrettably by a few large hospitals and in a limited time intervals of hospitals (in this paper, under “hospital”, it understand all medical treatment establishments which include not only hospital but also others such as general clinic, medical service unit and so on). For example, Viet-Duc hospital has published officially data of traffic accident patients (medical examined and/or treated at this hospital) in several years (2005-2007) and in some special events such as Tet-festivals (New Year after lunar calendar) only.

Since several years, the health sector tried to improve such situation by many efforts in collection and storage of traffic accident data for their own purposes. It seems that there are two agencies under Ministry of Health (MOH) to implement this work and therefore there are two sub-databases: the main- and the additional ones.

- The main traffic accident sub-database of the health sector is included as a subset of a larger database of the so-called “Accident-Injury Database”. In 2006, MOH has begun to include this database into the compulsory statistical system of the sector by issuing an official form (“Accident-Injury Form”) and by assigning this work to the “Accident-Injury Prevention Department” (see MOH, 2006). It is this department who is responsible for the traffic accident database of MOH while all health management agencies at administration levels (central, provincial, district, ward/village) are responsible for fill in the form with primitive data in their own local area. The traffic accidents are classified as V01-V99 of ICD10. The database stores related information of all kinds of medical injuries such as working accident, poisoned etc, not traffic accident only. So, it is simply by marking whether traffic accident is the main reason of injury or not. That is why this sub-database could provide very few details.

- Furthermore, in 2009, the “Preventive Medicine Department” has developed another sub-database by using the so-called “Traffic Accident Form” and distributed to 100 top-hospitals special software to record more information of traffic accidents patients at these hospitals. This new form add more fields special to traffic accidents such as information on motorcycle helmet, alcohol concentration etc so that it could provide a better understanding on traffic accident situation.

This study has the aims:

- To clarify systematically the special features of existing traffic accident database of the health sector\(^1\) that could lead to useful conclusion remarks for further development of such database sustainably and especially, for its inclusion into a larger one, the coming Integrated Traffic Safety Database.

- To use the available data for an insight to the traffic safety circumstance in complementation for those from traffic police. So, it could be confirm various strong/weak aspects of traffic accident database of traffic police.

In the available literature, there are various separated papers which give information on the traffic accident patients at hospitals of Vietnam. In the Project for Development of Hanoi

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\(^1\) For short, from now on, under “the database” it understands the traffic accidents database of health sector while the other database will be noted clearly, for example, the database of traffic police.
Human Resource of Traffic Safety (TRAHUD), various synthesized data of Viet-Duc hospital are presented (see TRAHUD, 2007). Under the context of the “Study on National Road Traffic Safety Master Plan until 2020” funded by Japan International Cooperation Agency (JICA), the results of a survey in 2007 on traffic accident patients in all medical establishments of 11/64 provinces are introduced in the study report (see JICA, 2009). Various annual statistical yearbooks of MOH confirm repeatedly that traffic accident as one of main causes of accidents and injuries (see MOH, 2008).

2. ON SPECIAL FEATURES OF TRAFFIC ACCIDENT DATABASE OF HEALTH SECTOR IN COMPARISON WITH THAT OF TRAFFIC POLICE

In this chapter, the general features in comparison between two databases of health sector and of traffic are discussed. To do that, interviews of related experts in both sectors as well as analysis of related official documents have been carried out. The main results as follows.

2.1 Point of View of Health Sector on Standard, Purpose and Object of the Database

The understanding of special features of any database in important for right usage of data. Under “traffic accident”, both the health sector and traffic police understand basically the same, (see MOH, 2006; MOPS, 2009) as “an event which happens suddenly outside of subjective people’s wish, on public transport ways by violating traffic regulation subjectively or by sudden incidents and there is material- and/or health damage”. But, the traffic accident database of health sector uses different standard (of fatal injury), purpose and object.

(1) Fatal injury standard
The biggest difference is related to fatal injury definition: under the “fatality” the traffic police understand any person who was killed outright or who died within 07 days because of the traffic accident (“7days-standard”) while the health sector use the time interval of 30 days (“30 days-standard”).

(2) Purpose and record object
The health sector has the aim to collect and store available primitive information of traffic accident under medical point of view, especially, on the medical trauma and the health damage. Object of each its record is one patient. This is the main difference with the database of traffic police which contains mainly factors related to reasons, consequences of accident and each record is related to one accident. For such aim, the database of health sector contain no information about the number of accident, for example, and other details such as conditions of road, vehicles or collision types, material damage etc. But, this database has a very valuable contribution in indicating the correct health damage which could be roughly estimated in database of traffic police.

2.2 Better Liability
The data published by traffic police is well-known with the underreporting at high level, (for example, see Duc et al. 2010). For its own conditions, the information from database of health sector seems to have better liability as follows:

- Regarding health sector, as a tradition, all hospitals should record information of any patient. So, they are familiar with the filling-in of primitive data. Of course, there would be error, but it is in acceptable limitation. As said, the record object is traffic accident patient who is examined and treated medically in hospital. It is noticeable that such
concept and the “traffic accident injured” used by traffic police are not the same as discussed late.

✓ The main information of this database is the medical trauma and the health damage which are recorded with high liability after the medical examination and treatment by professional persons.

It is such better liability that this database could be used for verifying the evaluation on traffic safety by police, especially, to evaluate the level of underreporting as below discussed.

2.3 Possibilities to provide further information related to traffic safety
For many years, the database contains information as indicated in subsection 2.1. Since 2009, to support the efforts of the Government in ensuring traffic order and safety, the health sector has asked all hospital to collect additional information such as helmet wearing, alcohol concentration etc. The analysis of such additional information shows that the database could provide further useful information.

Table 1 Comparison between the database of health sector and that of traffic police

<table>
<thead>
<tr>
<th>Item</th>
<th>Database of health sector</th>
<th>Database of traffic police (*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of traffic accident</td>
<td>Similar</td>
<td></td>
</tr>
<tr>
<td>Object of record</td>
<td>Each record is related to one patient</td>
<td>Each record is related to one accident</td>
</tr>
<tr>
<td>Main inputted information</td>
<td>Related to medical trauma and health damage of patient</td>
<td>Related to causes, situation, conditions and consequences of accident</td>
</tr>
<tr>
<td>Agencies to record primitive information</td>
<td>All medical establishments from grass level until central (about 13, 000 establishments nationwide)</td>
<td>All provincial/district traffic police team (about 1000 units nationwide)</td>
</tr>
<tr>
<td>Standard of fatal injury</td>
<td>Any person who was killed outright or who died within 30 days as a result of the accident</td>
<td>Any person who was killed outright or who died within 07 days as a result of the accident</td>
</tr>
<tr>
<td>Systematization in collection and storage</td>
<td>Low but better level</td>
<td>Low level</td>
</tr>
<tr>
<td>Completeness of data fields (level of filled-in fields)</td>
<td>Good</td>
<td>Low. Many data fields are empty.</td>
</tr>
<tr>
<td>Completeness of records</td>
<td>The data collection system is still in establishment process.</td>
<td>Very low. It is the background for underreporting</td>
</tr>
<tr>
<td>Correctness of data</td>
<td>Not 100%, but acceptable</td>
<td>At different levels with different fields.</td>
</tr>
<tr>
<td>Over-, Underreporting</td>
<td>Both at low levels, but objectively</td>
<td>Underreporting at very high level</td>
</tr>
<tr>
<td>Consistency</td>
<td></td>
<td>There are still inconsistency problem</td>
</tr>
<tr>
<td>Accessibility</td>
<td>Difficult</td>
<td>Difficult</td>
</tr>
</tbody>
</table>

(*) Source “Duc et al. (2010)"  

2.4 Shortcomings
The Table 1 shows a comparison between the database of health sector and that of traffic police.
For different reasons, the database could not avoid various shortcomings:

- Lack of systematization: The establishment of such database asks efforts of many people in all hospitals during many-years. This fact leads unfortunately to low level of systematization of data, especially, for problems in changes of data collection/storage manner.

- Incompleteness: Primitive data from some provinces/hospitals are still not available. For example, regarding 2009, there are data of 59/63 (94%) provinces and of 84% top-hospitals only.

- Inconsistency: The available data seem not always consistent and this issue should be paid with attention in exploiting this database.

- Inaccessibility: The database are not open for any stakeholder, especially, the Ministry of Health has no task to publish related data compulsorily.

3. INSIGHT OF TRAFFIC SAFETY IN 2009 WITH HEALTH SECTOR’S DATABASE

Based on database of their own, traffic police has conclusions about the traffic safety by themselves. In the Table 2, their official synthesized data of traffic safety in 2009 are presented. With these data and data of last years, the traffic police tried to show that with numerous efforts, traffic accidents are under control. But in fact, the correctness of these results could not be confirmed. These data, except the fatalities one, are highly underreported. So, it is necessary to have an insight into the traffic safety situation with other liable information source.

Table 2 Traffic accident data of 2009 published by traffic police

<table>
<thead>
<tr>
<th>Traffic accident</th>
<th>Total number</th>
<th>Fatalities</th>
<th>Injured</th>
</tr>
</thead>
<tbody>
<tr>
<td>All kinds</td>
<td>12,492</td>
<td>11,516</td>
<td>7,914</td>
</tr>
<tr>
<td>Road</td>
<td>11,758</td>
<td>11,094</td>
<td>7,559</td>
</tr>
<tr>
<td>Railway</td>
<td>442</td>
<td>190</td>
<td>262</td>
</tr>
<tr>
<td>Inland waterway</td>
<td>292</td>
<td>232</td>
<td>93</td>
</tr>
</tbody>
</table>

**Additional data**

- Population: 86,024,600 (Source: General Statistic Office in “GSO (2010)"
- Registered Motorized Vehicle: 31,502,087 (Source: Ministry of Transport 2010)

In this chapter, information of health sectors will be used as opponent to the above-said conclusion of traffic police. Regrettably, the related information could not be fully recorded by various reasons. The main sub-database contains data of 59/63 provinces and the additional one, data of 84/100 top-hospitals only. But even with available database, useful conclusions could be found. It seems that this control is in first steps only and traffic accidents are still high and become serious concern of society.

3.1 Seriousness of Traffic Accident

There are several statements that could be found based on health sector data to confirm the seriousness of traffic accidents as below.

**1) Percentage of traffic accident among other kinds of injury**

The Table 3 presents synthesized data of all kinds of injuries in 2009. This table confirms the
seriousness at high level of traffic accidents by a very high percentage of sufferers (39.42%) and of fatalities (63.66%) among various injuries kinds. Similar conclusion has been confirmed for other last years, such as in “JICA (2009)” and others.

(2) Total number of traffic accident injured
This number is one of most popular indicator in traffic safety. It is well-known that in Vietnam, the official published value by traffic police is always underreported. It seems that only the extreme serious injured are counted. Regarding 2009, as shown in the Table 2, this indicator has value of 7,914 and unrealistically low. This is quite similar in many other developing countries as indicated by the Asian Development Bank (ADB) in their famous guidelines “ADB (1996)”.

Table 3 Traffic accident among other kinds of injuries

<table>
<thead>
<tr>
<th>Injury kind</th>
<th>Sufferers</th>
<th></th>
<th>Fatalities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity</td>
<td>%</td>
<td>Quantity</td>
<td>%</td>
</tr>
<tr>
<td>Traffic accident</td>
<td>441,890</td>
<td>39.42%</td>
<td>4,965</td>
<td>63.66%</td>
</tr>
<tr>
<td>Working accident</td>
<td>168,886</td>
<td>15.06%</td>
<td>499</td>
<td>6.40%</td>
</tr>
<tr>
<td>Exposure to animate mechanical forces</td>
<td>63,887</td>
<td>5.70%</td>
<td>177</td>
<td>2.27%</td>
</tr>
<tr>
<td>Falls</td>
<td>138,082</td>
<td>12.32%</td>
<td>209</td>
<td>2.68%</td>
</tr>
<tr>
<td>Accidental drowning and submersion</td>
<td>4,520</td>
<td>0.40%</td>
<td>479</td>
<td>6.14%</td>
</tr>
<tr>
<td>Burns and corrosions</td>
<td>18,698</td>
<td>1.67%</td>
<td>151</td>
<td>1.94%</td>
</tr>
<tr>
<td>Poisoned</td>
<td>20,576</td>
<td>1.84%</td>
<td>102</td>
<td>1.31%</td>
</tr>
<tr>
<td>Intentional self-harm</td>
<td>12,386</td>
<td>1.10%</td>
<td>316</td>
<td>4.05%</td>
</tr>
<tr>
<td>Exposure to inanimate mechanical forces</td>
<td>77,894</td>
<td>6.95%</td>
<td>244</td>
<td>3.13%</td>
</tr>
<tr>
<td>Other and unspecified</td>
<td>174,294</td>
<td>15.55%</td>
<td>657</td>
<td>8.42%</td>
</tr>
<tr>
<td>Total</td>
<td>1,121,113</td>
<td>100.00%</td>
<td>7,799</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Source: MOH with data of 59/63 provinces

It is remarkably that from this table, in 59/63 provinces only, the health sector announced 441,890 traffic accident patients while in the Table 2, traffic police published the nationwide number of fatalities and injuries at very smaller values. In few next paragraphs it will try to clarify this big difference.

The traffic accident database of health sector uses concept “patients” as any one who are suffered traffic accident and have been medically examined and treated in hospital. The total number of such patients is published in the Table 3 with the value of 441,890 for 2009. This number is in no case as same as the (real) total number of traffic accidents injured. There are four impacting aspects that make these data different. The study team has proposed correction factor at 114.8% as indicated in the Table 4.

With this Total Correction Factor, the number of traffic accident sufferers could be: 507.290. So it seems that in 2009, a half of million of people have been injured by traffic accidents. And the rate of such injured per 100,000 habitants is 590 and per 10,000 registered motorized vehicles is 161.

These high values reconfirm the seriousness of traffic accidents
(3) Total number of fatalities
As said before, the published fatalities number in 2009 of traffic police (7,914 as in the Table 2) under “7days-standard”. So, to comparison with that of health sector or with other countries, for example, with data from the publication of the “International Traffic Safety Data & Analysis Group” in “IRTAD (2010)”, it should be corrected into “30days-standard” by correction factor 108% as indicated in “IRTAD (1998)” and become 8,547 as presented in the Table 5. The values of the fatalities rate (per 100 000 inhabitants and per 10 000 registered motorized vehicles) seems not so high and they show the effectiveness of efforts in ensuring traffic order and safety.

Table 4 Relation between the number of patients and that of injured by traffic accidents

<table>
<thead>
<tr>
<th>Impacting aspect</th>
<th>Impact</th>
<th>Correction factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>One injured could be medically examined and treated in more than one hospital</td>
<td>higher</td>
<td>C1 = 95.8% See (1) for explanation</td>
</tr>
<tr>
<td>There are injured who could treat medically by themselves or by small private medical clinic/room (not at any hospital)</td>
<td>lower  than the (real) number of traffic accident injuries</td>
<td>C2 = 103.1% See (2) for explanation</td>
</tr>
<tr>
<td>The recorded number is of 59/63 provinces. It lacks that of 4 rest ones</td>
<td>lower</td>
<td>C3= 117.4% See (3) for explanation</td>
</tr>
<tr>
<td>The sufferer of other injury kind could declared as traffic accident’s patient</td>
<td>higher</td>
<td>C4= 99% See (4) for explanation</td>
</tr>
</tbody>
</table>

Total Correction Factor C = C1.C2.C3.C4 = 114.8%

Notes:
(1) C1 could be estimated by using the average rate of patients who move to other hospital for further treatment in comparison with the total number. Any patient who wants to do that should bring his/her health profiles. So, the hospitals could know the percentage of patients who have examined and treated in other hospital before. In 2009, following health sector, this is 4.2% that is why, the correction factor C1 would be 100% - 4.2% = 95.8%.
(2) C2 could be estimated by using the average rate of medical service capacities (calculated in term of patients’ beds as health sector used) of small private medical examination rooms with that of hospitals. With the data provided in “GSO (2010)”, such average rate is 3.0% while the percentage of hospitals is 97.0%. So the correction factor C2 would be 100/97.0 = 103.1 %.
(3) C3 could be estimated by using as the rate of medicine service capacities of 53 provinces (who provide data) in comparison with the whole health system (excluding that of sanatorium). Calculation based on data from “GSO (2010)” shows that the rate is 85.2%. So the correction factor C3 would be 100/85.2 = 117.4 %.
(4) C4 could be estimated by experts’ survey. Followings interviews with management agencies of health sector; impact of this factor would be very low for the patient could not receive any benefit by such miss-declaration and the traffic accident sufferer has some special features in comparison with some other kinds of injury. It is estimated by interviewed experts that C4 = 99.0 %
Table 5 Value of fatalities indicators of traffic police under “7days-standard” and “30days-standard”

<table>
<thead>
<tr>
<th>Indicator</th>
<th>“7days-standard”</th>
<th>“30days-standard”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of traffic accident fatalities</td>
<td>7,914</td>
<td>8,547</td>
</tr>
<tr>
<td>Fatalities rate per 100,000 inhabitants</td>
<td>9.2</td>
<td>9.9</td>
</tr>
<tr>
<td>Fatalities rate per 10,000 registered motorized vehicles</td>
<td>2.5</td>
<td>2.7</td>
</tr>
</tbody>
</table>

The total number of fatalities recorded by health sector is 4,965 only. The big difference 8,547 - 4,965 = 3,582 between this number and that of police is understandable for this number denote the fatalities at hospitals only. But the percentage 3,582/8,547 = 42% of fatalities outside of hospitals (including the killed outright) is too high. It could be seen as the fierceness of traffic accidents and/or the low capacities of medical emergency as indicated in “JICA (2009)’

Among 507,290 sufferers, there were 8,547 fatalities and 498,743 injured-only. This corrected number of injured-only could be used to evaluate the underreporting of published number of injured-only (7,914 in Table 2, as said, unrealistically low). It seems the underreporting level is about 63 times, a very high one!

But there is a strong argument to justify this estimated underreporting level. The corrected numbers (8,547 fatalities and 498,743 injured-only) is equivalence with the fact that for each fatality, there are 58 injuries (498,743/8547=58.35). This number is quite in accordance with the famous Vietnamese Injury Pyramid (published 2001), that for each fatality, there are 58 injuries at difference seriousness (figure 1)

It is remarkably that regarding road traffic accident, another study by using regression, showed that even the traffic police ignore all injuries with low seriousness, their published ember of injuries seems underreporting 7-15 times, see “Duc et al. (2010)”.

3.2 Confirmation of Special Features of Traffic Accidents
Based on the database of the traffic police, some special features of traffic accident could be found. It is remarkably that, the database of health sector provides similar conclusions qualitatively, as follows, for example.
(1) Working age group has the highest risk
As shown in the figure 2 with data of health sector, the working age group (20-60) has the highest risk and it is an ominous sign the teen-age group has very high percentage of risk. This conclusion of health sector is similar with that of traffic police, that “age of accident offender forms a normal distribution. Age group from 20 to 29 years old accounted for 38% of the total offenders, followed by those in the 30’s age group which shares 19% of the total. Young people aged below 20 years and those in the older age group of 60 years old and above still share 14% and 2%, respectively” (see JICA, 2009).

(2) Alcohol usage leading to accident
Similar conclusion is found from data of health sector in relation of alcohol usage, see figure 3, in which the working- and teen age groups use alcohol at highest levels. Traffic police had the same conclusions as follows: “among the accidents caused by alcohol, a majority (above 90%) of offenders is in the working age” (see JICA, 2009).

(3) Male gender has the higher risk
As shown in the figure 4, the male gender has the higher risk and this is quite similar to the conclusion of traffic police as “about 2/3 of accident offenders are male” (see JICA, 2009).
3. CONCLUSIONAL REMARKS

As said above, this study has the aims:
- To clarify systematically the special features of existing traffic accident database of the health sector
- To use the available data of 2009 for an insight to the traffic safety circumstance in complementation for those from traffic police. So, it could be confirm various strong/weak aspects of traffic accident database of traffic police.

While targeted to record information related to health damage of traffic accident, the traffic accident database of health sector has special features such as:
- It is not considered as official (as that of traffic police)
- Different standard for fatal injury (“30days-standard”)
- Record object is “patient”, not accident
- Better liability and
- Still in developing stage

The database of health sector is the sole important source outside of traffic police that could help effectively to understand the traffic safety situation. It confirms that in 2009 though the traffic accidents are under control, but still very serious. This seriousness of traffic accident is quite clear with followings:
- Highest percentage of traffic accident among other kinds of injury
- Total number of traffic accident injured in 2009 is about a half of million.
- Rate of fatalities per 100,000 inhabitants and per 10,000 registered motorized vehicles seems not so high and they show the effectiveness of efforts in ensuring traffic order and safety

The study has found the Total Correction Factor \( C = 114.8\% \) for the total number of traffic accident sufferers. Based on this factor, it could reconfirm that the number of injured published by traffic police is unrealistically low. It shows the underreporting level is about 63 times, a very high one. The calculation, on the other hand, proved that the corrected data are quite in concordance with a rule from the Vietnamese Injury Pyramid (published 2001 by Ministry of Health), that for each fatality, there are 58 injuries at difference seriousness

It confirms several conclusions of traffic police such as the working- and teen-age groups have highest risk of accidents and highest level of alcohol usage etc.
This database has still limitations:
- The underreporting of total number of accidents is regrettably impossible for this database contain no related information.
- Comparative analysis of data in long-term is still difficult for the database are newly established.
- High inaccessibility and the health sector do not feel necessary to publish the data.

With such importance of traffic accident database of health sector, it would propose as follows
- More attention would be paid for a development sustainably of this database.
- It needs more efforts for collection and storage of primitive data of last years which are still distributed in various medical establishments.
- Improve the accessibility of data.

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