

# **A Study on the Evaluation of Vulnerability by Neighborhood Unit through the Analyzing of Trends in Safety Accidents**

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## **Abstract**

Safety accidents refer to accidents that occur due to safety carelessness in daily life. The Ministry of Interior and Safety selected life safety as an index for evaluating the safety level of the region, and since 2016, the evaluation results have been announced every year. Therefore, this study analyzed the trend of the number of safety accident paramedics, a risk indicator in the life safety field of the local safety index, so that safety promotion can be achieved by diagnosing the vulnerability of safety accidents by region. As a result of analyzing the safety accident first aid activity log in Sejong City for 6 years from 2017 to 2022, 5,786 safety accident first aid activities were conducted. For the analysis, the analysis was conducted using information such as the date, time, and age group and occupation and address of the patient in the first aid activity log. In addition, in order to analyze the vulnerability by region, Sejong City was divided into five neighborhood units: northern, central, eastern, southwest, and new city center according to its characteristics, and major safety accidents were analyzed by neighborhood unit. The characteristics of the occurrence of safety accidents were analyzed annually for each neighborhood unit, and information such as the type, season, time zone, age group, and occupational group of safety accidents was used. In addition, the analysis was conducted by linking the analysis results with regional characteristics such as population structure, industrial structure, and major facilities of the neighborhood unit and characteristics of safety accidents. Through the analysis results, it is judged that vulnerability can be judged by region, and safety promotion activities and priorities necessary to prevent safety accidents can be applied according to region and group.

**Key words:** safety accident, life safety, local safety index, neighborhood unit, first aid activity log

## **I. Introduction**

### **1. Meaning of Safety Accident**

The local safety index of the Ministry of the Interior and Safety is an index that diagnoses the relative safety level between regions by evaluating six safety fields with five grades. The life safety field evaluates the degree of safety against accidents caused by safety carelessness in daily life. The most influential in the evaluation is the risk index, '119 emergency cases related to life safety per 10,000 people', which has 50% of the total score.

### **2. Purpose of the Study**

Sejong City had a poor grade in the life safety field of the local safety index from 2018 to 2023. Excludin

g 2022, it is rated grade 5, which is ranked 8th out of 8 regions. Continuous occurrence of safety accidents is not only a risk to the safety of residents, but also incurs social costs due to first aid activities and injuries. Therefore, it is necessary to identify priorities for improvement in the field of life safety

### **3. Scope and Method of Study**

This study targets Sejong City in Republic of Korea and conducted an analysis. The data for analysis were based on the regional safety index published between 2018 and 2022. This is the 119 first aid activity log related to living safety per 10,000 people between 2017 and 2021. A statistical analysis was conducted using the regional safety index evidence and population characteristics by neighborhood unit. In the analysis of the vulnerability of safety accidents by living area, the analysis was conducted by classifying the characteristics into 'When, Where, Who, What'.

## **II. Trends in Safety Accidents by Neighborhood Unit in Sejong City**

### **1. The Classification and Characteristics of the Neighborhood Unit in Sejong City**

Sejong City's neighborhood units can be classified into five categories: northern, central, southwest, eastern, and new city. The northern was formed around industrial complexes. In the central part, Jochiwon-eup, the original city center, is located, and there is a university campus. The southwest is adjacent to major cities in other areas adjacent to Sejong City. The east was formed around smaller industrial complexes than the northern. New city is a planned city area created by the Happiness City Construction Plan.

### **2. Trends in Safety Accidents by Neighborhood Unit in Sejong City**

More than 900 safety accidents in Sejong City occurred annually. In particular, 1,070 cases occurred in 2019. In 2021, the number of cases was low at 906, but the number of cases in 2020 and decreased by 19. The number of cases in the neighborhood unit of the new city was the highest, followed by the central, northern, southwest, and eastern areas. The frequency of occurrence is different, with the number of first aid cases per 10,000 people. The frequency of occurrence is decreasing. The frequency of occurrence of new cities is the lowest, and the frequency of occurrence is low in the order of central, eastern, southwest, and northern areas. The trend is also decreasing in new cities, central and eastern areas, but increasing in northern and southwest areas. This trend is believed to be due to the distribution of the population in which 75.8% of the total population resides in the new city and the annual increase in population.

## **III. Vulnerability of Safety Accidents in Sejong City**

## **1. Types of Major Safety Accidents by Neighborhood Unit in Sejong City**

Safety accidents in Sejong City were analyzed for 5 years from 2017 to 2021. In terms of Sejong City as a whole, lacerated accidents occurred the most with 1,633 cases, followed by blunt force accidents with 750 cases, 696 injury accidents, and 693 crashes. Lacerated accidents were the most common by neighborhood units, but there was a difference in the ranking by type of accident injury. Crashes are the second in the northern, where there are many industrial complexes. The southwestern, where construction is continuously underway adjacent to nearby large cities, was the same. On the other hand, in the central part of the original city center, where the original city center is located, injuries are the second. In the eastern, there was only 4 differences from crashes, where blunt force accidents were the second or the third. The new city had a very large number of lacerated accidents with 903, and among the top five accident injuries, the only one caused by high-temperature liquid. When the frequency of occurrence is checked, the pattern is different. In new city, the incidence of lacerated accidents was 7.5 cases, which was lower than that of the eastern part, which had the lowest incidence of 17.5. Overall, the number of new cities was large, but the number of occurrences was lower than that of other neighborhood units.

## **2. General Characteristics of Safety Accidents in Sejong City**

The characteristics of accident injuries were confirmed according to season, time zone, occupation, and gender. When analyzed by season, it was found that it generally occurred in summer and autumn and less in winter. By type of accident injury, lacerated accidents occur most often in summer, but there is no significant seasonal difference. However, injury accidents occurred most often in spring, and accidents caused by animals/insects occurred mainly in summer and autumn. It was found that autumn occurred most frequently in high-temperature liquid accidents, but there was no significant difference between seasons.

When analyzed by time zone, most of them occurred mainly in the active morning (06:00~12:00) and daytime (12:00~18:00). However, injury accidents mainly occurred at night (18:00~24:00) and early morning (00:00~06:00). Water accidents occur very little at dawn (00:00~06:00), but are concentrated during the day (12:00~18:00) and at night (18:00~24:00).

When analyzed by job type, most of the accident injuries of office workers were common. In particular, the accident rate of office workers was the majority of machine-induced accidents. Accidents caused by high temperature liquids had few accidents, and occurred to infants, students, housewives or unemployed. In particular, infant and toddler accidents accounted for about 40% of all accidents.

When analyzed by gender, most of the accidents occurred more in men. However, accidents caused by high-temperature liquids occurred more in women.

### 3. Analysis of the Vulnerability of Safety Accidents by Neighborhood Unit in Sejong City

Lacerated accidents are the top priority in the entire neighborhood unit, so a comparative analysis was conducted. The number of occurrences in the number of new cases occurs frequently in the under 10 years old and in the 30s, but it occurred frequently in the northern, eastern, and southwest over 40s, and in the central part in the 20s and 60s or older. On the other hand, the frequency of lacerated accidents per 10,000 population was the highest in the new center and northern part of the country under the age of 10, and the highest in the central part in the teens and 20s. In addition, the frequency of occurrence in the eastern and southwest was high in the under 10s and teens. This is because they are vulnerable to lacerations according to age groups, but there is a difference in the ranking of the number of lacerated accidents due to differences in population composition by neighborhood unit. Therefore, it is necessary to manage the age group with a high incidence.

In the northern, the second-largest accident type was a crash, which occurred mainly in those in their 50s or older over the past 5 years. However, the frequency of occurrence appeared in the order of 50s, 30s, and 20s, and was mainly counted in factories/industry/construction facilities or seas/river/mountains/ paddy fields. As a result of confirmation, it was confirmed that the case of occurrence in the sea/river/mountain/ paddy field occurred at the site of the landscaping water industry. Therefore, safety management for industrial complexes and the landscape water industry is necessary.

In central, the second-highest accident type was in the order of 60s or older, 50s, and 40s in both the number of accidents and the frequency of occurrence. In particular, the place of occurrence was in the order of home, off-road traffic areas, and commercial facilities. Due to the nature of injuries that occur mainly from night (18:00 to 24:00) to early morning (00:00 to 06:00), accidents that occur in traffic areas and commercial facilities outside the road seem to be the main cause of the deterioration of judgment due to drinking. However, the most common place is home, and it is impossible to rule out whether it occurs due to crimes such as domestic violence.

The eastern part is a high school with the second highest accident type, and the number of accidents has occurred in the order of 60s or older, 30s, and 50s over the past five years. However, it was difficult to judge due to the low number of occurrences due to the nature of the eastern part with a small population. Nevertheless, it mainly occurred in houses, exercise facilities, factories/industry/construction facilities. In the case of houses and exercise facilities, it is judged to be due to carelessness, but in the case of factories/industry/construction facilities, additional analysis of the characteristics of individual accidents is required.

In the southwest, the second most common accident type was a crash, which occurred mainly in those in their 60s and 50s or older, even though the number of occurrences was small. In addition, the frequency of occurrence was also high for those in their 60s and older. There were also many places of occurrence in the sea/gang/san/ paddy fields and factories/industry/construction facilities. Outdoor accidents occurred mainly in mountains and paddy fields, and mainly in construction facilities, not industrial complexes. The same type of accident as in the northern or a separate countermeasure is required.

In addition to Dunsang High School, which is the second priority for accidents, Shindosim analyzed accidents caused by high-temperature liquids. Slump accidents occurred in the order of under the age of 10, teens, and 50s, and the frequency of occurrence was also high. The characteristic part is that most of the occurrences are at home, and the number of occurrences is similar in other places. Therefore, it is necessary to analyze the lifestyle in the home by age group and prepare countermeasures. Accidents caused by high temperature liquids are accidents that occurred more in women than in men. Both men and women occurred a lot in infants and students. The characteristic part was that in the case of women, infants, housewives, and students, in the order of occurrence. The place of occurrence is concentrated at home, and the place that has occurred continuously over the past five years is also only at home. Therefore, it is necessary to emphasize the precautions when dealing with high-temperature liquids, centering on infants, housewives, and students in the home.

#### **IV. Conclusion**

This study analyzed the characteristics of safety accidents by neighborhood unit in order to improve the life safety of Sejong City. Accordingly, the direction of improvement was derived according to the characteristics of safety accidents that mainly occur for each neighborhood unit. However, the analysis did not sufficiently reflect the vulnerable factors or current status of safety accidents by neighborhood unit. Location information of safety accidents was also not acquired due to personal information problems, so no proposal was made to improve the physical environment in detail. Accordingly, it is necessary to acquire location information or to identify urban spatial information for each administrative district and reflect it in the analysis. In addition, it is necessary to derive priorities for safety improvement by reflecting the severity of injuries in the analysis.

#### **References**

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