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Dear Readers;

We are greatly honored to meet you with the new issue of the Hittite Occupational Health and Safety Journal. The progress of our magazine in its field depends on the support and favor of you, our readers. In order to enhance the quality of our journal and ensure its continuity, we have added experts in their fields to our editorial board.

In each issue of our magazine, we aim to publish articles on various fields of Occupational Health and Safety. In this issue of the journal, we are sharing two original research articles that we believe will contribute to the literature.

We wish all our readers enjoyable and productive reading. Sincerely,

## Prof. Dr. Dursun Ali KÖSE

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## An Overview of The Relationships Between Accidents and Near Miss Events

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#### An Overview of The Relationships Between Accidents and Near Miss Events

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#### Abstract

There are various approaches to prevent occupational accidents. Investigating performing root-cause analysis to the causes of occupational accidents is a widely used method. However, the root-cause analysis approach is a precaution taken after the event because of a work accident. Another indicator that shows the potential for occupational accidents to occur is near-miss events. The best way to prevent occupational accidents is to be informed about the near-miss events that started the accident. It provides us with opportunities to identify a near-miss event and learn the precautions that must be taken to prevent the accident from causing dire consequences and eliminate its causes. In this study, various studies revealing the relationship between accidents and near-miss events in different sectors were examined and concrete suggestions were put forward to ensure that both employees and employers adopt this approach based on reducing accidents.

Keywords: Near-misses; accidents; accident precursor; safety management; industrial sectors

#### **1. INTRODUCTION**

It's easy to make excuses for an accident. A mistake is often denied by saying, "It could have been worse". We call this self-justification. However, the definition and classification of a near miss requires much more insight. It involves the recognition of dangerous situations and actions before an actual event occurs. It requires good observation, judgment, and critical thinking.

Herbert W. Heinrich (1931) stated that a fatal or major accident could occur due to thirty minor injury accidents and approximately 300 near-miss events. The accident pyramid, introduced to the occupational safety literature as the Heinrich Pyramid Theory, is shown in Figure 1[a]. Figure 1[a] shows that for every accident, there may be more near-miss events that may be precursors to some accidents and less significant consequences (Wright and Van der Schaaf, 2004; Pariyani, 2011).

In 1969, Frank Bird Jr. examined a group of 641 occupational accidents in a workplace; death or loss of limb, etc. He claimed that the basis of the accidents was 10 minor injury accidents, 30 accidents caused by machinery and equipment, and 600 near-miss events (Figure [b]).



Figure 1 Heinrich [a], Bird [b] and ConocoPhilips [c] Accident Pyramids

More recently, ConocoPhillips Marine (2003) also demonstrated the huge difference between serious accidents and near-miss events. ConocoPhillips' study found that for every major injury or serious event, there are an estimated

3000 near misses. The increase in the number of near-miss events demonstrated significant improvements in safety culture and accident prevention in the workplace. It also found that over 300,000 risky behaviors for every major injury (Figure 1 [c]).

The natural conclusion that the presented security pyramids teach us is that obvious that proactive safety management and event management, not properly analyzing accidents and real events, and not creating visibility into what is happening under the iceberg will lead to painful consequences.

In various definitions of near-miss events, they are accepted as antecedents of accidents and explained that they are events that can be repeated and observed in more environments than accidents (Jones et al., 1999; David et al., 2006; Saleh et al. 2013; Papillion, 2014; Gnoni and Saleh, 2017; Yıldırım, 2021; Duan and Zhou, 2023).

WHO (2005) defines a near-miss event as an important problem that can potentially cause harm but is not accidental. Additionally, in 2015, OSHA defined it as a situation that could have caused serious accidents but did not occur events.

In the Occupational Health and Safety (OH&S) regulation published by the Ministry of Labor and Social Security in 2012, a near-miss event is defined as "an event that occurs in the workplace, which has the potential to cause damage to the employee, workplace or work equipment, but does not cause damage" (Official Gazette No.28512, 2012).

The unifying point of all the definitions is that a near-miss event, which does not result in negative consequences, has a positive outcome.

Some statistics have shown that near-miss events account for 75% of the total accident number. Many studies have confirmed that near-miss events constitute a source of information, thanks to a correct understanding of security measures. Also, learning from near-miss events is cheaper than learning from accidents (Guo et al., 2016; Zhou et al., 2017).

Most near-miss studies have focused on gaining a qualitative insight into how the events leading to the accident unfolded.

There are generally two ways to go about this. The first of these is a retrospective analysis, which focuses on determining the causal basis and production stage of the near-miss events. The second is a forward-looking analysis of hypothetical futures that highlight potential occupational accidents (Saleh et al., 2013; Zhou et al., 2017).

According to the research conducted by Thoroman et al. (2018), near-miss events are seen as an important tool to improve safety for three reasons. First, they provide a lower inference regarding safety prevention because more-near miss events occur than accidents. Second, since there is a consistent relationship between accidents and near-miss events, near-miss events provide information about the potential accident situation. Thirdly, it provides information about how competent the system is here by determining error compensation factors thanks to the measures taken against recorded near-miss events.

Hollnagel (2004) stated that the reason why accidents occur is that the truth behind them is not fully defined. He stated that finding the cause or explanation of accidents would provide positive developments to prevent accidents in the future. He explained that near-miss events should be recorded and that it would be correct to interpret them according to the recorded near-miss events.

Storgard et al. (2012) stated that major accidents could be prevented by applying the results obtained from the analysis of near-miss events and accidents. They suggested that a functional reporting system requires establishing a culture of no blame, management's will to improve security, good communication, feedback, training, and an easy-to-use system.

Work accidents and occupational diseases occurring in various business lines in Turkey cause many employees to be injured, disabled and lose their lives.

OHS Law No. 6331 (2012) mentions reporting near-miss events that occur in the workplace among the duties of the employer (OHS Law No. 6331, article 14, 2012). In addition, the legal obligation to collect near-miss event records at the stage of identifying hazards in risk assessment studies is mentioned (Official Gazette No.28512, 2012). However, this information is based mainly on accidents and does not take into account near-miss events that can cause accidents or dangerous events.

Although it is a legal obligation in Turkey, near-miss records are not kept in many sectors and the understanding of nearmiss events has rarely been established. Additionally, there are a limited number of scientific publications on near-miss events.

#### 2. REPORTING OF NEAR-MISS EVENTS

Because near-miss events are precursors to accidents, analyzing near-miss events is a proactive approach to reducing accidents and can be considered a leading indicator of safety performance. In recent years, some researchers have noted that in addition to identifying near-miss events, it is important to report nearmiss events and analyze reports to predict the probability of accidents.

To learn from near-miss events, various organizations have begun to develop reporting systems since the 1950s. This safety management system and near-miss event reports were determined to be vital for safety (Taylor, 1977; Thomas, 2012; Thoroman et al., 2018).

Reporting near-miss events encourages a proactive approach to accident prevention and contributes to increased overall safety. If adequate corrective-preventive actions are implemented based on the analysis results of near-miss events, accidents caused by the same root cause can be prevented from occurring. In other words, near-miss events increase the chance of gathering preliminary information about possible accidents (Erdoğan, 2011; Hasanspahi**ć** et al., 2020).

A prerequisite for successful near-miss reporting; depends on both creating a fair culture approach and knowing the duties and responsibilities.

Fair culture approach; To get the maximum benefit from a near miss report, every employee needs to understand what a near-miss event is and the system in place to catch a near-miss event. It should also clearly state how people who experience a near-miss event will be treated and the person who reports the near-miss event. It should be made clear that the company encourages near-miss reporting and that it will not result in punitive measures. Fair culture approach; It has a positive impact on the work environment as it encourages employees to report errors and thus helps the company learn from mistakes. This approach is in direct contrast to the Blame Culture. For the success of Fair Culture, employees must provide ongoing training and information regarding near-miss reporting and investigation procedures.

Knowing the duties and responsibilities: A prerequisite for a successful near-miss event is that everyone throughout the company has a positive safety culture. An appropriate OSH requirement is to enable each personnel to fulfill their responsibilities.

Hasanspahić et al. (2020) examined the results of a survey administered to sailors of various experiences, ages, ranks, and nationalities to examine near-miss management systems in maritime. The results showed that near-miss reporting limits appropriate reporting owing to various obstacles. They argued that most shipping companies have the understanding that the more reports there are, the better the quality of the near-miss reporting system, whereas the focus should be on how to improve methods of evaluating near-miss results. They stated that they think that with the continuous training of the crew for the near-miss reporting system, the reporting culture will be improved and therefore safety will increase.

Like accidents, near-miss events vary in severity and probability, but tracking near-miss events should be seen as

an opportunity to improve safety performance.

In recent years, many researchers have focused on near-miss incidents in high-risk sectors such as maritime, civil aviation, iron and steel, petrochemical, and power plants. Additionally, many of these researchers argued that serious accidents could be prevented by applying corrective-preventive actions to data obtained from the analysis of near- miss events and accidents.

The prerequisite for a results-oriented reporting system is the company management's determination to increase safety and the effort to develop a culture of not blaming, good communication and feedback with employees, continuous training, and the creation of an easy-to-use system.

On the other hand, it has been observed that although most companies have written procedures specifying their near-miss reporting obligations, they do not improve their reporting procedures.

The factors that prevent employees from reporting are insufficient knowledge in identifying near-miss events, cultural differences between employees, a culture of blame and fear of punishment, leadership style, and incompetence of managers. To report a near miss, employees must have sufficient knowledge to understand the consequences of potential near-miss events. Insufficient information creates an obstacle to reporting near-miss events (Hasanspahić et al., 2020).

Subject matter experts have stated that it is easier to report near-miss incidents electronically rather than recording them in writing. They also expressed that it was easier to control the feedback regarding the report through the electronic form. However, some older employees may have problems using electronic media (computer or mobile phone), making it necessary to prepare paper-based reports. In addition, the report content should include all descriptive information regarding near-miss events because these are important for possible subsequent analysis (Hasanspahi**ć** et al., 2020).





Hollnagel (2004) stated that the reason why accidents

occur is that the truth behind the accidents cannot be fully defined. He also expressed that all near-miss events should be recorded and that it would be more correct to interpret the recorded near-miss events according to the events and situations.

Jones et al. (1999) showed that when employees were motivated to address near-miss events and increased nearmiss reporting from 0 to 0.5/person\*year in activity over 13 years, lost time due to injuries was reduced by approximately 75%.

Uth and Wiese (2004) investigated the relationship between accidents and near-miss events using data from an organization called ZEMA Accident Center (Zentrale Meldeund Auswertestelle) in Germany. As seen in Figure 2, it has been determined that the number of accidents decreases as near-miss event records increase.

#### **3. NEAR-MISS APPLICATIONS IN SOME SECTORS 3.1. Chemical Sector**

The chemical sector is one of the most dangerous sectors compared to almost all other sectors in terms of physical, chemical, and biological hazards. The chemical sector is a very high-risk sector where most accidents result in death, serious injury, or occupational diseases. Therefore, near-miss events in the chemical sector must be carefully monitored and their consequences examined in detail.

Van der Schaaf (1995) stated that in a 3-year study period for the design and implementation of the "Near Miss Event Management System" in a chemical plant in Rotterdam, in the southwest of the Netherlands, 90% of the accidents were; It was determined that technical failure occurred in 30%, organizational failure in 10%, operator failure in 50%, and other reasons in 10%. It has been stated that to prevent accidents, it is necessary to focus on near-miss events, which are the precursors of the accident. The importance of training, safety rules, persuasive efforts, and volunteering in reporting near-miss events was stated.

Jones et al. (1999) conducted a study to determine the relationship between accidents and near-miss events in a chemical plant with 3,500 employees in Norway. Figure 3[a] shows that there was a decrease in the number of accidents, with 1,800 near-miss events being reported from 1985 to 1997. In their study conducted in a chemical plant by Dee et al. (2013), they explained the importance of creating a driving force for appropriate hazard identification and corrective actions for the near-miss event management system to be effective. They stated that classifying near-miss events and providing feedback has a positive contribution to risk management.

In recent years, such studies in the chemical sector have degraded to a level where near-miss reporting is no longer sufficient about the number of serious injuries or damage to provide informative feedback. That is, very few accidents occur in the chemical sector, which can be used as a useful database in terms of the relationship between near-miss events and accidents to improve safety.

#### 3.2. Maritime Sector

After the iceberg accident of the famous Titanic ship, which was said to be "God can't sink it" in 1919, many researchers concentrated their studies on maritime accidents.

In the study conducted by Jones et al. (1999) on Norway's maritime sector, it was found that there was an inverse relationship between near misses and accidents. That is, as near-miss event records increase, the number of accidents decreases. Figure 3[b] shows that while near-miss events in the Norwegian shipping sector increased between 1990 and 1997, the accident numbers that occurred decreased significantly. They stated that accidents would decrease if more focus was placed on the importance of near-miss events.



**Figure 3** Relationships between accidents and near-miss events that occurred at a chemical sector [a] and maritime sector [b] in Norway (Jones et al., 1999).

Yoo (2018) used route data of commercial and large fishing vessels to determine the areas of near-miss events along the sea coast of South Korea and calculated the ships' distance and time to near-miss events locations from 57824 near-miss events that occurred throughout 2014. As shown in Figure 4[a], shows that the relative frequency of near-miss events increases as the colors turn red, and relatively dangerous locations occur more frequently in areas approaching Busan Port. According to the distribution of 412 collision accident locations between 1997 and 2016 in Figure 4 [b], the accidents mostly occurred in places close to Busan Port, where the density of near misses is high.



**Figure 4** Frequency of collision accidents of ships (1997–2016) [a] and near-miss event density on the sea coast of South Korea (2014) (Yoo, 2018)

#### 3.3. Providing Vehicle Maintenance Service Sectors

Winkler et al. (2019) examined a company with 11,000 employees providing maintenance services in Israel between 2000 and 2005 in terms of the number of accidents and near-miss events. In Figure 5[a], they found that the annual number of near misses and accidents has decreased over the years. On the other hand, despite the decrease in the accident frequency over the years, periodic fluctuations are observed in both accidents and near-miss numbers between 2000 and 2004 in Figure 5[b]. It has been determined that the fluctuations in the number of near-miss reports are also reflected in accidents. They put forward this situation with the view that accidents decreased with the development of the company's near-miss culture.



Figure 5 Annual [a] and moth [b] numbers of accidents and near misses (Winkler et al., 2019)

#### 3.4. White Goods Sector

Today, although the white goods industry has switched to robotic technology in its manufacturing, the number of accidents can be significant since the human factor cannot be completely excluded.

Andriulo and Gnoni (2014) investigated the relationship between near misses and accident causes for each department in the Bosch Bari plant. In their study, they implemented two indices defined as the "Near Miss Index" and "Accident Index" to verify the distribution of both accidents and near miss events in each department. As seen in Figure 6, they found that accidents were almost non-existent in sections with many near-miss events.



**Figure 6** Distribution of near-miss and accident events changes for different departments of the Bosch factory (Andriulo and Gnoni, 2014)

#### **3.5. Construction Sector**

The construction industry ranks first in terms of fatal work accidents compared to all other sectors. Construction industry; It covers a wide range of sub-sectors such as construction, road, bridge, tunnel and metro construction. In such a wide range and very risky sector, it is almost inevitable that there will be a lot of work accidents. On the other hand, many subject experts have stated that accidents will drop to acceptable risk levels after near-miss events in the construction sector are reported and examined.

Wu et al. (2010) conducted a study to close the information gap required for data analysis on this subject by monitoring near-miss events in construction sites in real-time. For this purpose, they used a sensor network that works with a system called Zigbee RFID (a system in which radio frequencies are used to collect information from the transceiver) and stores and transfers security information about equipment and materials. As a result of the research, it was determined that 49% of the 4,640 near-miss events occurred as falls, 15% as crashes, 12% as electric shocks, and 8% as tripping.

Yang et al. (2016) developed wearable inertial measurement units (WIMUs) for employees to collect near-miss data in the construction industry. It is designed as a system that can automatically detect and document near-miss falls based on kinetic data with WIMU. According to the values obtained from the WIMU worn by workers on their bodies, it was stated that it showed 87.5% accuracy performance in near-miss falls and could be used to detect near-miss events and predict future falling accidents (Figure 7). Additionally, it has been stated that the proposed WIMU-based approach will provide financial benefits to businesses due to its small ergonomics and low cost.



Figure 7 Concept of near-miss fall detection using WIMU (Yang et al., 2016)

Raviv and Shapira (2018) analysed 212 tower crane safety violations in the construction industry, as shown in Figure 8; examined the proportional relationships of different causal factors for the severity levels of three events: "near-miss", "damage" and "injury-fatality". By focusing on the connection of near-miss events with the tower crane and the analysis of the causal factors that prevent the events from turning into accidents, it has been understood that there is a relationship between injury/fatality and near-miss events. They stated that the negatives can be prevented by taking precautions in near-miss events.



Figure 8 Causal factor ratio for severity levels (Raviv and Shapira, 2018)

Zhou et al. (2017) analyzed the near-miss management system (WNMS) data of the subway construction of Wuhan, China's largest city. More than 1,100 near-miss events have

been reported in the database. Between 2011 and 2015, it was determined that near-miss events varied over time. It has been observed that near-miss events in the five years was lower in spring and winter and higher in summer and autumn. In addition, it was found that the most common time period for near-miss events during the day was between 8 am and 12 am (Figure 9).



**Figure 9** Variation of near-miss events frequency to month [a] and time of occurrence of near-miss events [b] in metro projects in Wuhan (Zhou et al., 2017)

Zhang et al. (2016) collected records of accidents and nearmiss events in the metro operating in Shanghai, China, and collected a total of 249 events that occurred in seven years (2005-2013). Figure 10 [a] summarizes these and shows that the number of near-miss events is 166, while the number of non-serious accidents is 57 and the number of serious accidents is 26. Figure 10 [b] shows the frequency of occurrence of events at daily time intervals over the period. It has been determined that most of the accidents and nearmiss events occurred in the morning when business was busy.



**Figure 10** Frequency of events by type [a] and frequency of events during the day [b] (Zhang et al., 2016).

#### 3.6. Cement Sector

The fact that the cement sector is structurally at the top of the heavy and dangerous work category and the low rate of educated and trained workforce in Turkey are the biggest negatives for a safe working environment.

Cement production, it goes through various production stages, starting from open pit mining until it reaches the packaging unit.

The risk factors that threaten OH&S in the main working areas of cement factories can be classified into four groups: risks that may lead to accidents, risks arising from the working environment, chemical and physical risks, and ergonomic risks arising from the work performed.

Unfortunately, no work has been done on the near-miss issue in the cement industry, which carries such a dangerous risk, until 2021.

Yıldırım (2021) conducted a near-miss and OHS perception determination survey on employees of two cement factories

in Turkey, which have two different OHS cultures. As a result of survey studies; While near-miss events are regularly recorded among cement factory employees with high OHS perception, there have been no accidents in the factory for the last 10 years. On the other hand, it has been determined that cement factory employees with moderate OHS perception are reluctant to record near-miss events and there have been some accidents in the factory.

#### 4. CONCLUSIONS

While developments in technology and industry make human life easier, unsafe conditions in working life cause negative consequences. Today, work accidents and occupational diseases threaten the lives of many employees and can cause financial losses.

Since near-miss events occur more frequently than accidents, they allow us to take precautions with proactive approaches. Reporting and investigating near-miss events prevents occupational accidents and is a low-cost and effective element. As explained in this study, examining near-miss events in many sectors and discussing their causes directly contributes to reducing workplace accidents. Additionally, research on near-miss events from a worker psychology perspective needs to be further investigated.

There is not enough research on near-miss events both in the world and in Turkey. However, we can prevent accidents if near-miss events are thoroughly investigated in every business. Therefore, it should not be forgotten that poverty will be prevented by preventing the waste of approximately 4-5% of both the World's and Turkey's Gross National Product (GNP).

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## HITIT JOURNAL OF OCCUPATIONAL HEALTH & SAFETY

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## Investigation of Occupational Hygiene Problems in Hair Dressors, Beauty Centers and Barbers; Case of Çorum Province

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Ebru Gökmeşe: Drew the graphics and compiled the results into a manuscript.

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## Investigation of Occupational Hygiene Problems in Hair Dressors, Beauty Centers and Barbers; Case of Çorum Province

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#### Abstract

Those who work in hairdressers, barbers and beauty centers deal with procedures such as hair cutting, dyeing, permanent straightening, perm, epilation, manicure and pedicure. If they do not pay attention to Hygiene, it is inevitable that they will transmit many diseases to themselves and their customers through contact, breathing or blood. This study was conducted by applying a survey consisting of 25 questions to employees of hairdressers, barbers and beauty centers, in order to reveal occupational Hygiene problems and to see the level of knowledge of the employees on this subject. The population of this research consists of employees working in hairdressers, barbers and beauty centers in the central district of Corum Province in 2021. The sample consists of a total of 209 people working in hairdressers, barbers and beauty centers, selected randomly. When education levels were examined, it was seen that primary education and below had a rate of 52.2%, and secondary education and above had a rate of 47.8%. The highest yes rate was "Do you wash your hands often?" with 98.6%. The lowest yes rate, 46.6%, was given to the question "Did this profession cause any discomfort for you?" When occupational Hygiene data are compared according to the educational status of the participants, do you know what to do if occupational accidents such as injuries, burns, chemical poisoning occur in the workplace? A statistically significant relationship was found in cases of knowing the question. According to these results, it was determined that the majority of employees had primary education or lower education and that they did not know what to do when work accidents occur, what personal protection means, and the importance of ventilation. It has been observed that their knowledge of what can be done to prevent work accidents or after they occur is low. It was concluded that employees in these lines of business should receive training and the training should be repeated at regular intervals.

Keywords: Occupational Hygiene, Hairdresser, Barber, Beauty Center

#### INTRODUCTION

Regulations regarding Occupational Hygiene within the scope of Occupational Health and Safety in the world and in Turkey are making rapid progress (Yaman, 2020).

The objectives of Occupational Hygiene include optimizing the physical and mental condition of employees, detecting and eliminating hazards that may occur in the work environment, meeting Hygiene requirements, performing periodic checks, providing occupational Hygiene training to employees, preparing an occupational Hygiene program, controlling epidemiological studies in the work environment, It is necessary to implement, control and improve employee exposure limit values and standards.

Occupational Hygiene is the field of science that enables the prediction, detection, evaluation and control of chemical, physical, biological, ergonomic and psychosocial factors that cause employees to become ill. This area; It conducts studies intertwined with chemistry, physics, biology and microbiology (Girgin, 2019).

According to the Occupational Health and Safety hazard classes notification published in the Official Gazette No. 28509 dated 26/12/2012, hairdressers, barbers and beauty centers are in the dangerous class. While there are nearly one million hairdressers, barbers and beauty centers in Europe, there are nearly 100 thousand hairdressers, barbers and beauty centers in our country (Bulduk, 2018). Lack of attention to necessary Hygiene practices and lack of supervision in hairdressers, barbers and beauty centers in court of personal Hygiene, salon Hygiene and equipment Hygiene in hairdressers, barbers and beauty centers (Senel, 2018). Employees of hairdressers, barbers and beauty centers must receive a Hygiene training certificate and the training must be continuous and detailed in order to protect public health (Senel, 2018).

Those who work in hairdressers, barbers and beauty centers are very likely to encounter blood-borne diseases. The use of tools by more than one person without providing the necessary Hygiene in procedures such as manicure, pedicure and epilation causes the transmission of blood-borne diseases (HIV-hepatitis group) from person to person due to injuries during the procedure (Boztaş et al., 2006).

Infectious diseases are common and fatal diseases and are caused by inadequate Hygiene and Hygiene habits. It has been observed that in cases where Hygiene habits are acquired, there is a decrease in diseases, a decrease in the rate of visiting a doctor and using medication (Taşkıran et al., 2019).

Health and safety checks should be carried out in accordance with the risk factors that may impair the health of the worker at work and endanger his safety. Physical, biological, chemical, ergonomic and psychosocial risk factors that will harm the health of the worker and endanger his safety in the working environment should be identified and precautions should be taken (Tekkanat, 2013).

Workers in hairdressers, barbers and beauty centers come into contact with materials such as dyes, perm chemicals, sprays and gels, and many cosmetic products used in nail and skin care. During the use of these products, there is serious exposure to chemicals that are skin and respiratory irritants, allergy-causing and carcinogenic (Şüküroğlu and Burgaz, 2018).

Products such as shampoos, hair sprays, perm solutions, perfumes, oxidants, hair dyes, solutions and creams contain chemicals. Exposure to chemicals by employees in hairdressers, barbers and beauty centers can often cause skin irritation, allergies and eczema through skin absorption and repeated contact. Irritating and allergenic chemicals often have harmful effects such as respiratory infections, dermatitis,

## Investigation of Occupational Hygiene Problems in Hair Dressors, Beauty Centers and Barbers; Case of Çorum Province

asthma, rhinitis and eye diseases (Bulduk, 2018).

The most commonly used products are chemical hair dye and hair spray. The chemicals used in hair dyes and sprays are quite dangerous. The chemicals it contains cause respiratory diseases and damage the heart and liver. In one of the studies, it was found that a substance found in hair dye in the urine and uterus of women had a carcinogenic effect (Şüküroğlu and Burgaz, 2018).

In another study, it was stated that the risk of bladder cancer increased by 50% after 1 year in hairdressers who had frequent contact with hair dyes. Hydrogen peroxide found in hair dyes consists of damaging radicals. For this reason, contact of these products with the scalp should be avoided and the employee should use gloves (Yenilmez, 2009).

Cell cultures, microorganisms, human parasites, bacteria, viruses and fungi that cause allergy, infection or poisoning are biological factors. Biological risks, which can enter the body through inhalation, digestive tract or absorption through the skin, eyes or wounds, have a higher mortality rate than chemical risks. This group includes viruses such as hepatitis B, C, HIV virus and acute liver inflammation (Baştaş Öz, 2018). Noise is an important risk factor in hairdressers, barbers and beauty centers (Bulduk, 2021). Medical treatment is not possible for hearing loss caused by noise (Yıldırım, 2017). Where hair dryers and steam devices are used together, consequences such as communication obstruction or hearing impairment may occur (Bulduk, 2018). Noise can cause physiological effects such as increased blood pressure, changes in heart rate, accelerated breathing, nausea, increased sweating, headaches and dilated pupils. This situation affects performance, leading to a decrease in efficiency and quality and impaired concentration (Şahin, 2021).

If Hygiene is not taken into consideration in hairdressers, barbershops and beauty centers, customers may be infected with immune deficiency virus (HIV), Hepatitis C (HCV), Hepatitis B (HBV), Human papillomavirus (HPV), impetigo, skin, nail and scalp fungal diseases and pediculosis. and employees may become infected. Viruses such as HIV, HBV, HCV can be transmitted through nails, hair follicles, blood and body fluids that are visible or visible through a microscope, and fungi can be transmitted through direct contact or the use of a material. The use of personal protection and protection methods, especially the use of gloves, are very important (Özaras et al., 2013).

If the equipment used in hairdressers, barbers and beauty centers is not disinfected, infections on the hands, body or scalp can be transmitted through contact. Infections such as head lice, scabies, staphylococcal infections such as impetigo, fungal candida albicans infections, fungal infections of the scalp such as tinea capitis (fringe) and bacteria pose risks (Şenel, 2018).

Diseases transmitted through blood or body fluids are among the serious health problems in our country and around the world. Using equipment contaminated with blood without sterilization causes the transmission and spread of infections. In a study, when people with Hepatitis B were compared with those with Hepatitis A infection, it was reported that those with Hepatitis B had more manicures and pedicures. (Togan ve ark., 2014). Therefore, employees should pay due attention to their personal Hygiene, equipment Hygiene (sterilization, decontamination and disinfection) and salon Hygiene (Güney, 2016).

For infection control, a safe working environment must be provided and adequate personnel training must be provided. Workplace procedures should include hand Hygiene methods, handling and disposal of sharp equipment, cleaning procedures for used towels and aprons, what to do in case of cuts or exposure to blood, and informing staff about vaccination.

Material safety data sheets for all chemicals used, including cleaning products and hair dyes, should be easily accessible. Hand Hygiene should be provided before and after contact with the client, after eating and using the toilet, after going to the toilet, after coughing or sneezing, after contact with blood and other bodily substances, and after removing gloves (Hairdressing Guidelines, 2015).

Equipment such as razors, scissors, combs, clippers, epilation devices, nail files, nail clippers and applicators used during procedures in hairdressers, barbers and beauty centers pose a risk of infection.

#### **MATERIAL AND METHODS**

209 people working in hairdressers, barbers and beauty centers in Corum Central district participated in this study voluntarily. A survey was prepared including the concept of Hygiene, questions to know and do about Hygiene.

In order to conduct the study, ethics committee approval was received from Hitit University Non-Interventional Ethics Committee with decision number 2021-66 dated 30.04.2021.

#### **Population of the Research and Sample**

The population of this research consists of a total of 488 workplaces, including 140 hairdressers, 260 barbers and 88 beauty centers, located in the Central district of Çorum province. (One person from each workplace was interviewed). The study was conducted in 2021, 282 employees were reached due to the pandemic, and the employees were selected by a simple random method. 58% of my sample was reached. Dikmen et al. In their study, they stated that they reached 38% of the sample (Dikmen, 2022). Alan et al. In the research article, 37% of the universe was reached and the health sensitivities of nursing students were examined (Alan, 2019). The fact that we reached 58% of the universe in our study is in accordance with the literature.

#### **Data Collection and Analysis**

The survey was answered by employees of hairdressers, barbers and beauty centers and at their workplaces. Due to the Covid-19 outbreak, the study was conducted when workplaces were open, the participation rate decreased and it took a long time to collect data.

Analyzes of the data obtained from the research were made

through the IBM SPSS<sup>®</sup> Statistics v.26 package program. Kuder-Richardson 20 (KR-20) method was used for the reliability of the measurements. Reliability is defined as the consistency between responses to survey items. The KR-20 method is used for the reliability of yes/no measurements, and it is considered sufficient for these coefficients to be 0.70 and above (Büyüköztürk 2019:183). Therefore, the reliability of the measurements in this study was evaluated using the KR-20 reliability coefficient and KR-20 = 0.808. It can be said that the measurements are reliable.

In reporting the data, descriptive information is presented in the form of number-percentage distributions and visualized with pie charts. Differences between groups in terms of categorical variables were examined with Pearson Chisquare, Yates-corrected Chi-square and Fisher's Exact Chisquare test. The statistical significance level for the tests was accepted as 0.05.

Pearson Chi-square is a statistical analysis method used to examine the relationship between categorical variables and is one of the widely used nonparametric tests. On the other hand, if the number observed in any eye of the cross table is less than 25, the Yates corrected Chi-square value is used. Additionally, if it is not possible to ensure that at least 80% of the eyes of the cross table are greater than 5, Fisher's Exact Chi-square test is used (Vurgun and Evliyaoğlu, 2017).

#### **RESULTS AND DISCUSSION**

#### **Content and Implementation of the Survey Study**

The results obtained from 209 people who participated voluntarily within the scope of the survey were created with pie chart (circular chart), frequency tables and Chi-square test (cross tables).

## Graphic Applications Prepared in SPSS Statistics Program

The tabular rates and percentages of the answers given by the participants to the questions prepared with the SPSS statistics 22 package software are shown in the form of a pie chart. In addition, cross-tabulations of the answers given to each question were created using the chi-square test, based on sociodemographic characteristics.

Table 1	Educational	status	distribution	of the	participants

Your ed	ucational status		
		Freguency (n)	Percentage (%)
	Primary education and below education level	109	52.2
Valid	Secondary education (High School) and above education level	100	47.8
	Total	209	100.0



Figure 1 Pie chart showing the distribution of educational status of the participants

Of the participants (209 people) working in hairdressers, barbers and beauty centers, 109 people have primary education or lower education level, while 100 people have secondary education or higher education level. This shows that 52.15% have primary education and below, and 47.85% have secondary education and above.

Questions		n	%	Total
Q1) Do you know what the word	Yes	204	97.6	200
hygiene means?	No	5	2.4	209
Q2) Have you heard the expression	Yes	198	94.7	209 209
Occupational Hygiene before?	No	11	5.3	
Q3) Do you wash your hands often?	Yes	206	98.6	
do, bo you wash your hunds often.	No	3	1.4	
Q4) Do you do daily workplace	Yes	200	95.7	209
cleaning?	No	9	4.3	
Q5) Do you use bleach and other	Yes	188	90.0	209
detergents for cleaning the toilet?	No	21	10.0	
Q6) Do you clean frequently touched	Yes	184	88.0	209
handsets, and desk surfaces) daily?"	No	25	12.0	
Q7) Are workbenches, equipment and	Yes	203	97.1	
tools disinfected?	No	6	2.9	209
Q8) If there is blood on the material	Vos	107	92.7	
or equipment, do you know how to	NI-	100	32.5	209
clean It?	NO	102	/./	
Q9) Do you ventilate the workplace regularly?	Yes	192	92.5	208
icguarry.	NO Voc	10	7.7 96.6	
Q10) Do you use an apron during hair cutting, washing and dyeing services?	No	20	17 A	209
O11) Are the towels you use during		20	13.4	
hair cutting, washing and dyeing	Yes	168	80.4	209
services personalized?	No	41	19.6	
Q12) If your answer to the question	Yes	36	73.5	49
towels to every customer?	No	13	26.5	49
017) Do you uso a face chield or mack?	Yes	169	81.3	208
Q13) Do you use a face shield of mask?	No	39	18.8	
Q14) Do you think you are aware of	Yes	182	87.1	209
or bleeding while working?	No	27	12.9	
Q15) Do you use gloves while	Yes	136	65.1	209
working?	No	73	34.9	
Q16) If your answer to the question	Yes	132	88.6	. 149
above is "Yes", are the gloves	No	17	11.4	
017) Do you know what to do if work		17	11.4	
accidents such as injuries, burns, or	Yes	1/8	85,2	209 209
chemical poisoning occur at work?	No	31	14,8	
Q18) Do you know whether the work you do poses a risk of causing	Yes	185	88.5	
infectious diseases?	No	24	11.5	
Q19) Do you serve customers with	Yes	117	56.0	209
wounds, cuts or itching?	No	92	44.0	
Q20) Are disposable materials	Yes	168	80.4	209
after use?	No	41	19.6	
Q21) Are disposable materials	Yes	144	68.,9	209
properly disposed of in the waste bin	No	65	311	
	Vos	07	46.6	
discomfort in you?	No	111	53.4	208
S23) Do you have any customers who object to the use of masks and disinfectants and temperature measurement and recording due to	Evet	111	53,1	209
	Hayır	98	46,9	
524) Do you or any of your employees have a "Hygiene Training Competence	Evet	131	62,7	209
Certificate"?	Hayır	78	37,3	
S25) Do you know that the materials you use during your operations, such as gloves, masks and aprons, are	Evet	184	88,0	209
called personal protective equipment?	Hayır	25	12,0	

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#### **ANNEX 1**

Survey Questions

Q1) Do you know what the word Hygiene means?

Q2) Have you heard the expression Occupational Hygiene before?

Q3) Do you wash your hands often?

Q4) Do you do daily workplace cleaning?

Q5) Do you use bleach and other detergents for cleaning the toilet?

Q6) Do you clean frequently touched surfaces (such as door handles, phone handsets, and desk surfaces) daily?"

Q7) Are workbenches, equipment and tools disinfected?

Q8) If there is blood on the material or equipment, do you know how to clean it?

Q9) Do you ventilate the workplace regularly?

Q10) Do you use an apron during hair cutting, washing and dyeing services?

Q11) Are the towels you use during hair cutting, washing and dyeing services personalized?

Q12) If your answer to the question above is "No", can you provide sterile towels to every customer?

Q13) Do you use a face shield or mask?

Q14) Do you think you are aware of the problems that may arise from cuts or bleeding while working?

Q15) Do you use gloves while working?

Q16) If your answer to the question above is "Yes", are the gloves disposable?

Q17) Do you know what to do if work accidents such as injuries, burns, or chemical poisoning occur at work?

Q18) Do you know whether the work you do poses a risk of causing infectious diseases?

Q19) Do you serve customers with wounds, cuts or itching?

Q20) Are disposable materials properly disposed of in the waste bin after use?

Q21) Are disposable materials properly disposed of in the waste bin after use?

Q22) Has this profession caused any discomfort in you?

Q23) Do you have any customers who object to the use of masks and disinfectants and temperature measurement and recording due to Covid-19?

Q24) Do you or any of your employees have a "Hygiene Training Competence Certificate"?

Q25) Do you know that the materials you use during your operations, such as gloves, masks and aprons, are called personal protective equipment?

#### PERSONAL INFORMATION

Your educational status

q Primary education level and below

 $\ensuremath{\mathsf{q}}$  Secondary education (High School) and above education level