

## Profile of unnatural deaths that were autopsied in Dr. Soetomo general academic hospital Surabaya 2017-2022

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### Abstract

Unnatural death is death caused by external causes, including death caused by intentional homicide and suicide and death due to unintentional reasons such as accidents. The objective is to analyze the profile of unnatural deaths that were autopsied in this study. This study is a retrospective descriptive study, using data from registration data, visum et repertum, and visum et repertum request letter as the source of information. The research variable consists of year, age, sex, cause of death, manner of death, region of trauma, and location of crime. Results show that the year of most cases is 2017, with 26 cases. The respondents' sex was more male, with a ratio of 2.2: 1 male to female. The most common age gap was 26-35 and 26-45. The most common nutritional status was normal. The highest frequency of cause of death is a blunt-force injury (25.6%), followed by the second highest is an illness (19.51%), and sharp-force injury (18.29%). The highest frequency of manner of death is homicide (58.53%). Followed by accident (9.75%), then suicide (6.09%), and undetermined (6.09%). The most common region of trauma in autopsied unnatural deaths was the head region, presented in 57.32% of cases, followed by the upper extremity region (41.46%), thorax (35.37%), and lower extremity (35.37%). The most common location of the crime was East Surabaya, with 19 cases (23.17%). In conclusion, most results were linear with other studies, while others varied due to several aspects such as culture, crime trends, economic status, etc.

**Keywords:** Unnatural Death; Autopsy; Forensics; Homicide; Suicide

### 1. Introduction

Death is an event that occurs when an individual experiences the discontinuation of the signs of life [1]. In the Government Regulation of The Republic of Indonesia (PPRI) Number 18 of 1981 on Clinical Post-Mortem Surgery and Anatomical Post-Mortem Surgery, as well as Organ or Human Tissue Transplant, it is stated that death is a human condition where it is decided by the authorized medical expert when the function of a person's brain, respiration, and heart rate has stopped. The World Health Organization defines the cause of death as "all those diseases, morbid conditions, or injuries which either resulted in or contributed to death and the circumstances of the accident or violence which produced any such fatal injuries.

Based on the manner of death (MOD), it is primarily divided into natural and unnatural death. Natural death is a result of "natural disease," which is considered a pathologic process that originates from the body's natural response to a sequence of internal (genetic) and external (environmental) factors (i.e., old age, disease) [2]. Unnatural death is caused by external causes, including death caused by intentional homicide and suicide and death due to unintentional reasons such as accidents [3]. An accident is an unforeseen and unexpected fatal event typically involving external force [2]. A suicide (arising from the Latin sui = "self" and cidium = "killing") is the intention of oneself to take one's own life. In

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comparison, a homicide (arising from the Latin homo = “man” and cidium = “killing”) is due to the deliberate killing by another person [4].

Cause of death (COD) refers to all the reasons that lead to death. The classification varies incredibly due to the extensive range of the terms. Nevertheless, the largest category of cause of death in unnatural death cases is traumatology. According to Yudianto [1], forensic traumatology is a study that focuses on the wound, the cause of the wound, and the therapy to treat the wound so that the wounded part can be restored. Traumatology can be divided into 3 main groups: mechanic, nature, and chemical. Mechanic can also be divided furthermore into blunt-force, sharp-force, and gunshot. Meanwhile, nature is divided into temperature and electricity, and chemical into acid and base. Another common mechanism in unnatural death is asphyxia; causes of death that belong to this category may include hanging, manual strangulation, and ligature strangulation.

An autopsy is a procedure that involves opening and examining the head, chest, and abdomen region and then removing the organs for dissection that may involve subsequent examination of microscopic sections, in order to determine the cause and manner of death along with evaluating any injuries or disease that may be present. Autopsy is derived from the Greek word “autopsia” meaning “to see oneself”, from the two words “auto” meaning self and “opsis” meaning eye. Although “necropsy” might be semantically the most accurate term to describe an investigative dissection of a dead body. But “autopsy” has been used so extensively that there is now no ambiguity in its meaning [5]. There are two types of autopsies worldwide: the hospital (medical) and the forensic (medicolegal) autopsy. Hospital autopsy is performed at the request of the patient’s physicians to clarify the cause of death, to shed light on the response to treatment, or the cause of some particularly puzzling aspect of the disease. On the other hand, The forensic (medicolegal) autopsy is ordered by legal authorities to determine the cause and mechanism of death, and whether the death was natural or unnatural [6]. It is conducted the body of someone suspected of dying due to an unnatural cause such as in cases of accidents, murder, or suicide [7]. The purpose of a forensic autopsy examination is to help determine the identity, determine the exact cause of death, mechanism of death and time of death, and examine evidence to determine the identity of the cause and perpetrator of the crime.

This research is done to analyze the profile of unnatural deaths autopsied at Forensic Medicine and Medicolegal Installation Dr. Soetomo General Academic Hospital Surabaya from 2017 to 2022. It is anticipated to add insight into the numbers of unnatural deaths and their characteristics in Indonesia

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## **2. Material and methods**

### **2.1. Type of research design**

This study is a retrospective descriptive study on profile of unnatural deaths autopsied at Dr. Soetomo General Academic Hospital Surabaya from 2017 to 2022.

### **2.2. Sampling technique and sample size**

The sampling technique of this study is total sampling, which fulfills all inclusion and exclusion criteria. The total sample size deemed to fit the criteria was 82 data points.

### **2.3. Inclusion-exclusion criteria**

#### *2.3.1. Inclusion criteria*

Subjects that are included in this research are:

- Unnatural deaths whose case is recorded in the Forensic Medicine and Medicolegal Installation Dr. Soetomo eneral Academic Hospital Surabaya from 2017 to 2022.
- Unnatural deaths that were autopsied.

#### *2.3.2. Exclusion criteria*

Subjects that are not included in this research are:

- Unnatural deaths autopsied with incomplete medical records.

## 2.4. Data collection

This study uses data from registration data, visum et repertum, and visum et repertum request letters as the source of information to obtain the distribution of demographics, MOD, COD, region of trauma, and location of death of the data in this study.

## 3. Results and discussion

### 3.1. Demography

#### 3.1.1. Year of Death

The most common year of death among autopsied patients of unnatural death was 2017, with 26 patients (31.7%) dying during that year. Following, 17 patients (20.73%) died in 2020. The least common year of death was 2022, with 6 patients (7.31%), and 2021, with 7 patients (8.53%).

**Table 1** Distribution and Frequency Based on Year

Year	Frequency	%
2022	6	7.31
2021	7	8.53
2020	17	20.73
2019	10	12.19
2018	16	19.51
2017	26	31.7
Total	82	100

According to Figure 1, the number of autopsies gradually decreased from 2017 to 2019, followed by a sudden increase in 2020 and a decrease in 2021 to 2022. The gradual decline aligns with research associated with unnatural death by homicide conducted by Riyanti et al. [8], which shows a decline in homicide cases consistently from 2017 to 2021, from 122 cases in 2017 to 36 cases in 2021. This is also demonstrated by Henky et al. [9], who showed a steady decrease in autopsies in Sanglah General Hospital, Bali, Indonesia, from 2011 to 2018.

The drop in autopsies in 2021-2022 was likely due to the COVID-19 pandemic and its effects on the medical field and society overall. Death rates in Dr. Soetomo General Academic Hospital Surabaya were at their highest, reaching over 100 deaths per day. Aside from that, healthcare workers were affected, and many were quarantined, leading to low human resources. This, in turn, hinders lots of deaths from being autopsied and discontinuing their procedure.

#### 3.1.2. Age

Most autopsied patients were in the 26-35 years and 36-45 years age group, each with 14 patients (17.07%). They were followed by 17-25 years age group with 13 patients (15.85%). 5 patients (6.09%) were fetus that have not developed completely and was unviable outside of utero, while 10 patients (12.19%) were newborns aged 0-3 days after birth. The average age of autopsied patients is 32 years old.

Similar results were obtained from research conducted in Manado, Indonesia, by Ango et al. [10], which shows that the most significant age intervals are 17-25 with 18 cases, 26-35 with 16 cases, and 36-45 with 16 cases. Research in Jakarta, Indonesia, by Riyanti et al. [8], also shows that the most common age interval is 17-25. Research done in other countries by Munir et al. [11], Marri et al. [12], and Parveen et al. [13] also revealed linear results that 21-30- and 20-29-year age intervals are significantly more common (35.5%, 31.93%, and 29.86% consecutively) than other age groups, following closely 31-40-year age group.

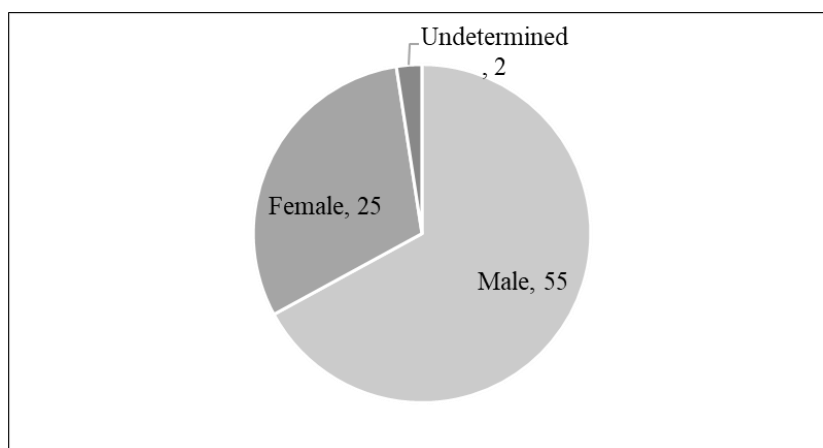
**Table 2** Distribution and Frequency Based on Age

Age	Frequency	%
Foetus	5	6.09
0-5 years (Toddler)	10	12.19
6-11 years (Childhood)	3	3.65
12-16 years (Early adolescence)	2	2.43
17-25 years (Late adolescence)	13	15.85
26-35 years (Early adulthood)	14	17.07
36-45 years (Late adulthood)	14	17.07
46-55 years (Early old age)	11	13.41
56-65 years (Late old age)	7	8.53
>65 years (Older age)	3	3.65
Total	82	100
Median	34	
Mean	32.74	

The high violent crime rate among late adolescents and adults may contribute to the trend of frequency in the age gap. Several biological, social, cultural, economic, and environmental factors interact to increase young people's risk of being involved in such behaviors [14]. This may also include factors such as temperament, cognitive ability, and family. The problem that triggers these fatal acts of violence are usually mobbing, physical bullying, or snatching. Adolescents and young adults are also more likely to partake in more dangerous activities, leading to fatal accidents.

### 3.1.3. Sex

This study found that most autopsied patients were in the 26-35 years and 36-45 years age group, each with 14 patients (17.07%). They were followed by 17-25 years age group with 13 patients (15.85%). 5 patients (6.09%) were fetus that have not developed completely and was unviable outside of utero, while 10 patients (12.19%) were newborns aged 0-3 days after birth. The average age of autopsied patients is 32 years old.

**Figure 1** Distribution and Frequency Based on Sex

An overwhelming majority of these cases are male, the ratio of male-to-female cases is (2.2):1. Among this research, 2 patients' sex is undetermined due to them being fetuses with young gestational age that have not developed their genitalia region. Thus, sex classification was not determined. This is a result that is consistent with research national and international. Suwandono et al. [15] conducted research in Surakarta, Indonesia that projects the percentage of

male cases is 70%, while female cases are 30% of all unnatural deaths. Research conducted in Pakistan by Parveen et al. [13] also shows linear results, with 78.47% of patients being male and 21.53% being female. According to Kumar et al. [16], linear research in India also revealed that males comprise 70.5% of the research, with 7194 victims. The consistent result was also shown from research by Parmar et al. [17], with a percentage of males reaching 71.19% and females with a percentage of 28.81%.

This result of male majority cases in unnatural deaths can be correlated to the fact that overall, male undertakes more outdoor activities and have specific social status. Ango et al. [10] stated that males usually have more aggressiveness, physical vigor, and impulsiveness and are likelier to partake in activities such as swimming and motorbike riding. This leads to males being the primary victims and sufferers of homicide and accidents.

### 3.2. Cause of Death

The highest frequency of cause of death is by blunt-force injury, becoming the cause of death of 21 patients (25.6%); the second highest is illness, which was initially thought to be caused by unnatural causes, with 16 patients (19.51%), followed by sharp-force injury (18.29%). The least common cause of death in autopsied patients was combustion with 0 patients, followed by poisoning and chemical burn, each with 1 patient (1.21%). The cause of death of 4 patients (4.87%) was undetermined due to advanced putrefaction. Among these, 16 cases turned out to be caused by illness, which means that these deaths were natural. The illnesses include coronary heart disease, chronic lung infection, gastric perforation, incarcerated hernia, etc. Amidst initial findings, it was suspected that these cases were unnatural; however, after the procedure of autopsy was done, it was soon discovered otherwise.

**Table 3** Distribution and Frequency Based on Cause of Death

Cause of Death	Frequency	%
Hanging	3	3.65
Strangulation	2	2.43
Suffocation	5	6.09
Blunt-force Injury	21	25.6
Sharp-force Injury	15	18.29
Gunshot	3	3.65
Drowning	6	7.31
Combustion	0	0
Poisoning	1	1.21
Chemical Burn	1	1.21
Illness	16	19.51
Non-viable	5	6.09
Undetermined	4	4.87
Total	82	100

The comparison of this result with results of other similar forms of research was very different one from another. The result of research in Manado, Indonesia, by Suwontopo et al. [18] shows a result of 50% of causes of death are from sharp-force injury and 50% from blunt-force injury. Another research from Manado, Indonesia, by Ango et al. [10], was different, which reveals that the most common cause of death is from sharp-force injury with a significant 58%, followed by blunt-force injury with only 9%. Meanwhile, another research from Pakistan by Ullah et al. [19] was also nonlinear, showing a staggering 60.14% of causes of death were due to firearm, followed by blunt force with 17.94%. Different results were carried out by Munir et al. [11] in India, who stated that the highest frequency was firearms, with 33 cases, followed closely by road accidents, with 31 cases. Parveen et al. [13] have similar results to Munir et al. [11], with the highest cases being firearm (41.32%) and road accidents (29.86%).

These different results from separate regions are caused by two main factors: different profiles of crimes and different trends in autopsies. Firearms mainly dominate violent crimes and homicides in India and Pakistan, while in Indonesia, firearms are less common and take up relatively lower frequency in violent crimes and homicide. This is contributed by the illegal distribution and usage of firearms, which are not common in Indonesia; thus, usually, only law enforcement personnel and hunters have access to firearms. Illegal firearms are still a significant problem in several countries. Munir et al. [11] stated that proper licensing and law enforcement are required on national and international levels, along with proper education and awareness to control this dilemma.

Meanwhile, different regions in Indonesia also have different frequencies of types of violent crimes. This research has shown that blunt-force crimes such as mobbing and beating are more common in Surabaya and regions near it than in Manado. Research by Suwontopo et al. and Ango et al. has shown that sharp-force violent crimes such as stabbing are more common in Manado. Aside from that, accidents are less familiar to be autopsied in Indonesia due to many factors such as religious beliefs and social opinion. Thus, much less accidental causes of death like road injuries are medically determined through an autopsy in Indonesia.

The high number of mechanical injuries, which include blunt-force injuries, sharp-force injuries, and gunshots, is a major problem globally. It is vital to treat violent crimes as a significant public health concern; effective media campaigns and technology should be used to educate the masses about the adverse impacts of violent crimes and to establish localized programs that would help in reducing violent crimes [20].

### 3.3. Manner of Death

The highest frequency of cause of death is by blunt-force injury, becoming the cause of death of 21 patients (25.6%), the second highest is illness, which was initially thought to be caused by unnatural causes, with 16 patients (19.51%), followed by sharp-force injury (18.29%). The least common cause of death in autopsied patients was combustion with 0 patients, followed by poisoning and chemical burn, each with 1 patient (1.21%). The cause of death of 5 patients (6.09%) was undetermined due to advanced putrefaction.

**Table 4** Distribution and Frequency Based on Manner of Death

Manner of Death	Frequency	%
Homicide	48	58.53
Suicide	5	6.09
Accident	8	9.75
Natural	16	19.51
Undetermined	5	6.09
Total	82	100

This result is linear to the research in Jakarta, Indonesia, by Riyanti et al. [8] that revealed that the most common unnatural death is homicide, with 407 out of 620 cases. However, some research from other countries suggested various other results. Research in Finland by Junno et al. [21] shows that among unnatural deaths, accidents rank highest at 47.4%, followed closely by suicides at 38.4%, and homicide was ranked lowest at only 4.39%, even lower than undetermined at 9.24%. Research in Bangladesh by Rahim and Das [22] also revealed accidents as the highest frequency at 68.92%, specifically road traffic accidents, while homicide and suicide were low-frequency MOD at 11.69% and 8% each. On the other hand, research in India by Munir et al. projected that homicide was the most common at 39.85% but closely followed by accidents at 35.51%. In another research in India by Anjanamma et al. [23], the highest frequency of manner of death was RTA (Road Traffic Accident) at 67%, followed by suicide at 26%, and lastly, homicide at 7%.

Homicide, suicide, accident, and crime rates in each region are different. These respective rates result from many factors, such as poverty, unemployment, stress, weapon ownership rate, social mobility, environmental landscape, population density, etc. Because of these particular factors that will differ from one region to another, dissimilar results of MOD ranks between research are expected.

Aside from that, the number and types of unnatural deaths that were autopsied should also be considered. An autopsy is necessary to identify the cause of death of a person. The consent for an autopsy lies with the next of kin or the family

members of the dead patient. Many Indonesian families do not consent to their relatives being autopsied for several reasons. This may include fear of the deceased's body being damaged, postponing the funeral, rejection from the deceased before he died, the body being considered too young or too old, lack of explanation to the family regarding the results of the autopsy, worry about the body's organs being removed, lack of information on the procedure and considers it unimportant, or is contrary to the culture and religion adhered to [9]. Not only in unnatural death settings, but autopsies are also crucial in natural death. This is because the correspondence rate between the clinical and post-mortem diagnoses is not very high, admitting future interpretations. The disagreement rate between the two diagnoses is essential not only for the clinicians and their future patients but also for the overall evolution of medicine and the relief of the deceased's relatives [6].

Because of this, accidents and suicides are very rarely autopsied because they consider it obvious their cause of death. However, no matter how obvious it may seem, the cause of death of a person can only be medically determined through autopsy. This contributes to the low percentage of accidents and suicides in this study, even when Indonesia's accidental rate and suicide rate are much higher than in this study.

### 3.4. Region of Trauma

In this study, a patient can experience multiple regions of trauma. The most common region of trauma among unnatural deaths that were autopsied in this research is the head, with 47 patients (57.32%) experiencing trauma antemortem in that region. The second most common region is the upper extremity with 34 patients (41.46%), followed by the lower extremity and thorax with 29 patients (35.37%). The least common is the pelvic region, presented in 9 patients (10.98%) in this study. 25 patients receive no trauma.

**Table 5** Distribution and Frequency Based on Region of Trauma

Region of Trauma	Present Frequency (%)	Not present Frequency (%)	Total Frequency (%)
Head	47 (57.32%)	35 (42.68%)	82 (100%)
Neck	21 (25.61%)	61 (74.39%)	82 (100%)
Thorax	29 (35.37%)	53 (64.63%)	82 (100%)
Abdomen	20 (24.39%)	62 (75.61%)	82 (100%)
Pelvic	9 (10.98%)	73 (89.02%)	82 (100%)
Upper Extremity	34 (41.46%)	48 (58.54%)	82 (100%)
Lower Extremity	29 (35.37%)	53 (64.63%)	82 (100%)

This result is similar to research conducted in Surakarta, Indonesia, by Suwandono et al. [15], where it was revealed the most common region of trauma in that research was also the head, with 53 out of 110 cases followed by lower and upper extremities, each with 47 and 46 cases. The least common region is the pelvis as well. This is also similar to research in Medan, Indonesia, by Marissha & Ismurizal [24], where the highest frequency of trauma region in blunt injury is the head (58.7%).

The head, continuously being the most common trauma region, may be affected by it being a very fragile and fatal area that could lead to severe injuries with minimal force than other regions. The upper extremity is also a common area of trauma; this can be due to victims' reflex to protect another fatal region, such as the thorax, abdomen, and head, thus creating defense wounds, which is quite common in mechanical injury victims. This is shown in research by Chattopadhyay & Sukul [25], with 90 out of 189 autopsies presented with defense injuries. This indicates that in these cases, the victims could apprehend the attack just prior to the moment of assault.

### 3.5. Location of Crime

In this research, the highest frequencies of the location of crime scenes among autopsied patients are located in East Surabaya with 19 patients (23.17%). The second highest with 18 patients (21.95%) is South Surabaya, continued by North Surabaya with 16 patients (19.51%), Central Surabaya with 12 patients (14.63%), Outside of Surabaya with 10 patients (12.19%), and lastly with the least frequency of location of crime scenes is West Surabaya with 7 people (8.53%).

**Table 6** Distribution and Frequency Based on Location of Crime

Location of Crime Scene	Frequency	%
Central Surabaya	12	14.63
East Surabaya	19	23.17
West Surabaya	7	8.53
North Surabaya	16	19.51
South Surabaya	18	21.95
Outside of Surabaya	10	12.19
Total	82	100

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#### 4. Conclusion

Differences in results between similar studies on this topic should be expected due to different crime trends in each area. This can be influenced by regional economic status, education rate, law differences, and many other factors that must be considered. This study hopes to shed insight into the demographic and prevalence of unnatural deaths in Indonesia, especially in Surabaya.

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#### Compliance with ethical standards

##### *Disclosure of Conflict of interest*

No conflict of interest to be disclosed.

##### *Statement of ethical approval*

Approval was obtained from the Health Research Ethics Committee of Dr. Soetomo General Academic Hospital, Surabaya.

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