

Using Sleman's Verbal Autopsy Health and Demographic Surveillance Data to Distinguish Ways of Death

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Introduction

Death can occur anywhere, with or without prior treatment by a healthcare professional. A good and complete death registry will meet the information needs. Such a registry will also enhance community safety efforts and policymaking in the health and population sectors. Analysis of risk factors, signs, and symptoms observed before death provides useful information for estimating diseases or causes of death. Verbal autopsy data must be explored in more depth to protect public law and improve health statistics.

Methods: This research used observational design. Data obtained from the Health and Demographic Surveillance System of Sleman. Research subjects were all deaths recorded in verbal autopsy document from 2014-2018. Descriptive statistical analysis was used.

Results: Differences in the proportion of gender from 2014-2017 were observed, where the number of women was higher than men. Most deaths were above 65 years of age. Most deaths were natural deaths. Unnatural deaths were caused by traffic accidents, drowning, murder, and others, with the most number of cases occurring in 2014 (12%). Indeterminate deaths occurred annually, with the most cases in 2017 (13%).

Conclusions: Verbal autopsy has succeeded in distinguishing between natural and unnatural death.

Keywords: *cause of death, way of death, verbal autopsy, surveillance system.*

Introduction

Deaths must be registered to protect the community. Complete information is needed to meet the needs of legal protection for community and health statistics. The documentation of research data with verbal autopsy can help reveal the manner of death and cause of death. Analysis of risk factors and signs and symptoms observed before death provides useful information for estimating diseases or causes of death. Without good analysis, deaths in the community will be difficult to group correctly. Moreover, the causes of death will be difficult to identify and could fall into other categories. Of course, if there are too many deaths included in other

categories, policymaking in the health sector will be affected.

Death investigations are important to perform before doctors sign the death certificate. Investigations include the causes and methods of death. The cause of death was formulated in ICD-10. The way of death is not purely a medical finding but is also influenced by the findings around the body. The grouping can also be affected by legal and administrative categories such as murder, suicide, accidents, or natural death¹. In the case of natural death, the doctor can immediately issue a death certificate, and the body can be buried or cremated. Natural death is death due to disease naturally and there is nothing suspicious in the vicinity of the discovery of the body. Conversely, in cases of unnatural deaths such as deaths due to criminal acts, trauma, poisoning, or unexplained causes, a forensic autopsy must be performed².

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Wahab et al³ reported that, in Indonesia, the highest cause of death in the community is stroke, followed by airway infection, and heart disease, which is not specifically more detailed. Herbst et al⁴, in a study entitled “Verbal autopsy-based cause-specific mortality trends in rural KwaZulu-Natal, South Africa” run in 2000-2009 revealed that verbal autopsy based on the correct method contributed to available information needed by policymakers.

Starting in 2014, the Faculty of Medicine, Public Health, and Nursing (FK-KMK), Universitas Gadjah Mada (UGM), implemented the Health and Demographic Surveillance System (HDSS) in Sleman Regency to explore health status data including verbal autopsy data. This study discusses the use of verbal autopsy data in the view of protecting public law and health statistics by exploring deaths based on the manner of death in Sleman Regency, Yogyakarta.

Materials and Methods

Subjects of this research were all deaths recorded in the HDSS Sleman verbal autopsy document. No sampling was conducted in this study so accidental sampling was applied. The number of samples pertains to all cases recorded in 2015-2018. The inclusion criteria were

deaths recorded in 2015-2018, while the study exclusion criteria were deaths that could not be completed after the data was re-verified by the enumerator. The study was conducted in Sleman from June to November 2019.

This research used secondary data. Death data from verbal autopsy HDSS were grouped by cause of death—due to disease and not due to disease. Death data due to disease were grouped by disease, and document analysis was carried out to measure the adequacy of information in the diagnosis. Then, the cases were grouped based on disease risk factors. Data on deaths not due to disease were grouped in traffic accidents, suicide, wildfire, violence, and natural disasters. The HDSS enumerator retrieved additional data to ascertain whether or not there was still a lack of data. Data were analysed descriptively for each cause and manner of death.

Result and Discussion

There was a significant difference in relation to the gender proportion of the mortality data based on the verbal autopsy of Sleman HDSS, in 2014 and 2017, where the female population was found higher than that of men. The factors that influence this incident need to be explored more deeply. The data is shown in Figure 1.

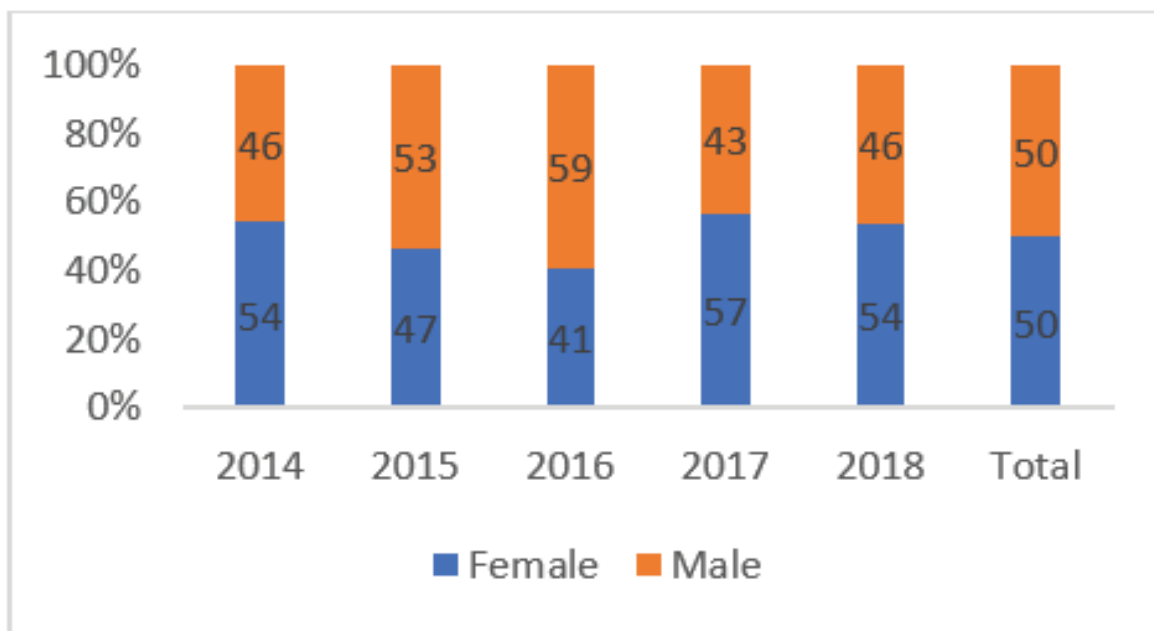


Figure 1 Death Cases by Gender

Most deaths in the sample occurred at the age of over 65 years, followed by the age of 50 to 64 years. Over the years, the number of deaths aged 65 years older had

increased. The number of deaths under the 15 years old was very small, less than 5% and the highest proportion was in 2014, at 4.8%. This data is shown in Figure 2.

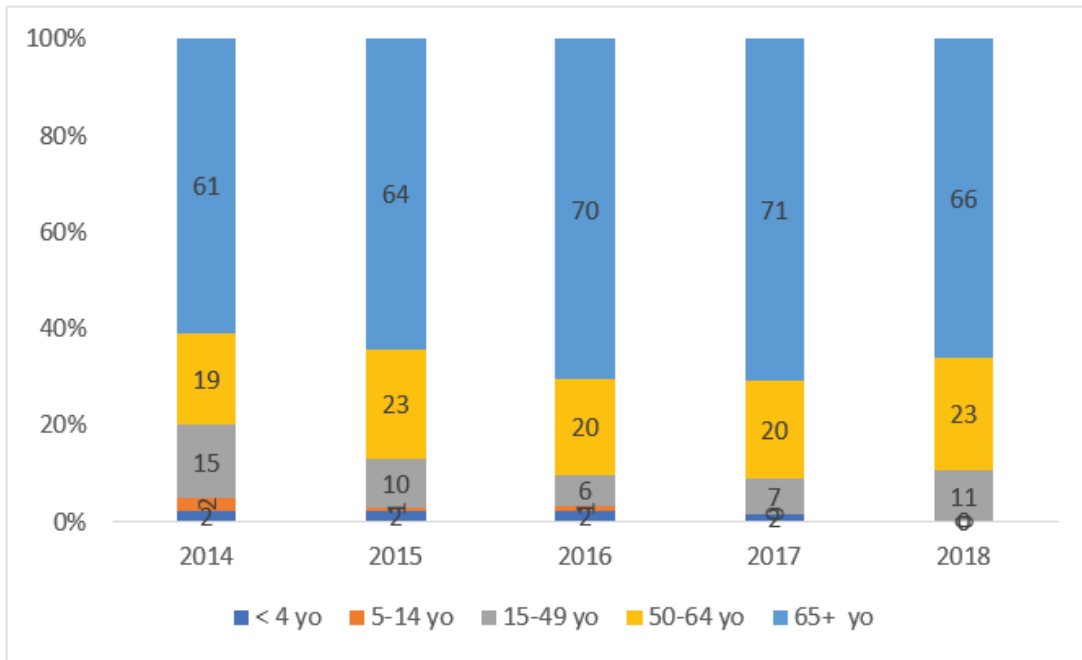


Figure 2. Deaths by Age Group

The verbal autopsy data showed that most of the deaths were natural deaths (Figure 3). The highest unnatural death rate in 2014 was 12%. Undetermined deaths occurred every year. Most cases (13% of all cases) happened in 2017.

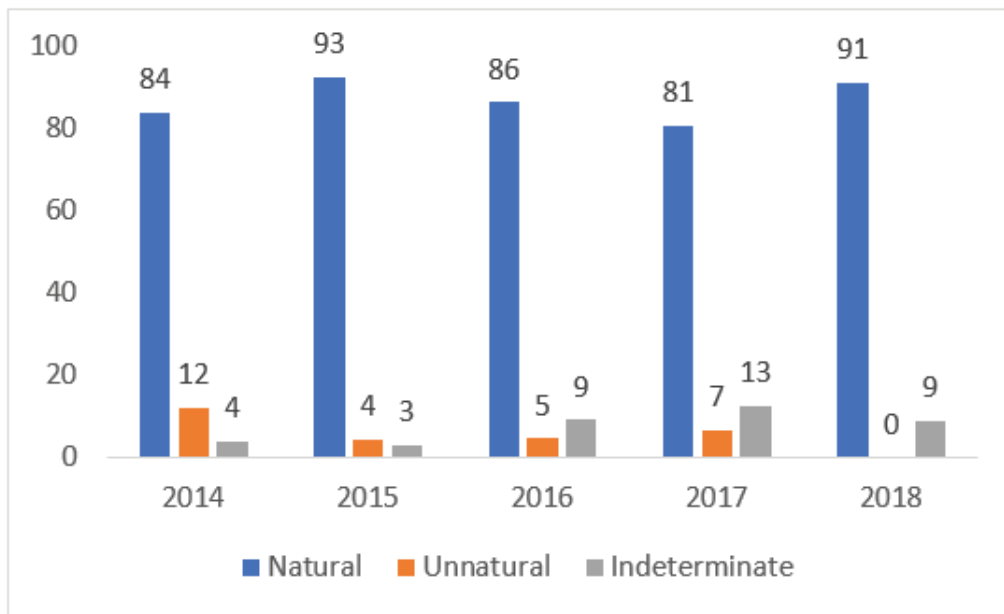


Figure 3. Cases of Natural and Unnatural Deaths per Year

Unusual methods of death involved victims of transportation accidents, suicide, fire, violence and natural disasters. The most deaths due to transportation accidents happened in 2017, while the lowest was in 2015.

Table 1. Death Prevalence by Unnatural Death Methods by Year

	2014	2015	2016	2017	Total
Accident	10	1	6	11	28
Suicide	1	3	0	2	6
Wildfire	4	0	1	0	5
Violence	0	0	1	0	1
Natural Disaster	0	2	0	0	2
Total	15	6	8	13	42

Deaths due to accidents were mainly unnatural accidental deaths. Intention-caused injury can come from within individuals, one of which is suicide. Research conducted by the author to get suicide was ranked second-most (Table 1). Table 2 showed death prevalence by subject characteristic. In this table researcher make bigger group of ways of death in 3 groups, injury, infectious disease, and non-infectious disease.

Table 2. Death Prevalence by Subject Characteristic

	Injury		Infectious Disease		Non-Infectious Disease		Total	
	n	%	n	%	N	%	n	%
Year								
2014	15	36%	20	17%	90	17%	125	18%
2015	6	14%	18	16%	113	21%	137	20%
2016	8	19%	34	30%	134	25%	176	26%
2017	13	31%	35	30%	144	27%	192	28%
Age								
1-4 y	0	0%	5	4%	8	2%	13	2%
5-14 y	3	7%	1	1%	2	0%	6	1%
15-49 y	8	19%	13	11%	43	8%	64	9%
50-64 y	6	14%	22	19%	114	22%	142	21%
65+ y	25	60%	74	64%	363	68%	462	67%
Sex								
Female	22	52%	60	52%	262	49%	344	50%
Male	20	48%	55	48%	268	51%	343	50%
Location								
Not at home	20	49%	60	52%	217	41%	297	43%
At home	21	51%	55	48%	310	59%	386	57%

Cont... Table 2. Death Prevalence by Subject Characteristic

Death during travelling								
No	41	100%	113	98%	521	99%	675	99%
Yes	0	0%	2	2%	6	1%	8	1%
Death certificate								
Not present	29	69%	63	55%	291	55%	383	56%
Present	13	31%	52	45%	239	45%	304	44%

Overall, the biggest deaths from year to year in this study consisted of deaths from stroke (29%) or vascular disorders followed by infection (16%), cancer (12%), metabolic death and abdominal pain (8%), and unnatural death (6%). For deaths based on infections, most were respiratory infections, one of which was pneumonia,

followed by death from tuberculosis, and HIV/AIDS. Malaria cases are still a cause of death in 2017 and 2018. Cancer deaths account for 12% of the total cases over the 5 years, with the largest sequence attributed to digestive cancer (25 cases). The proportion of causes of death to natural mortality is presented in Figure 4.

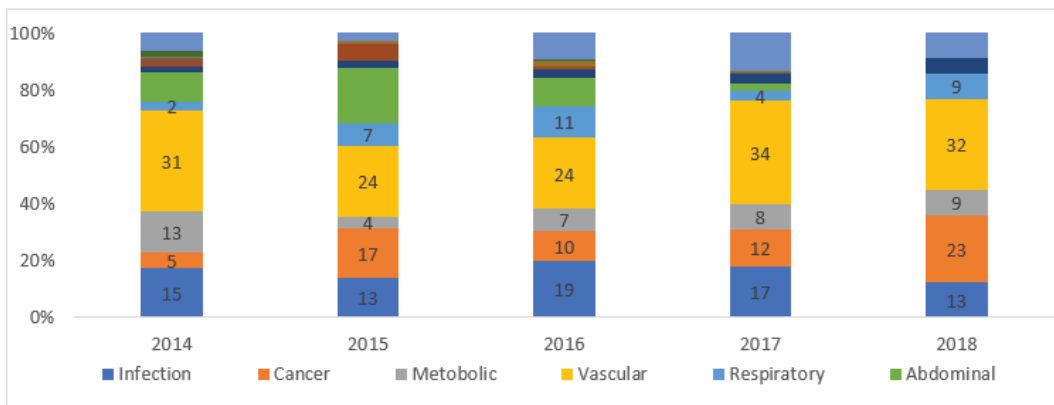


Figure 4. Natural Death

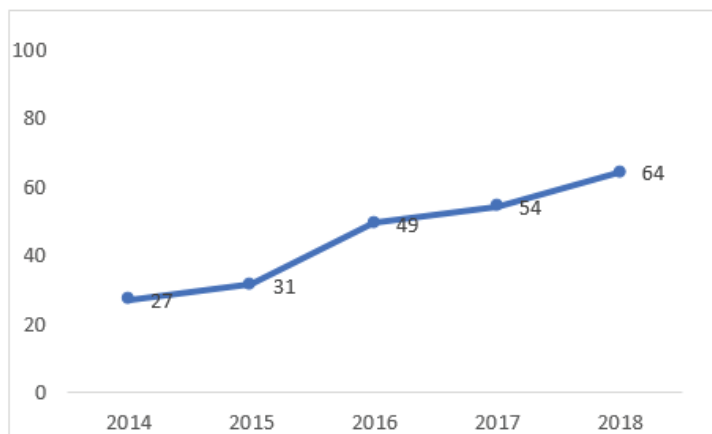


Figure 5. Percentage of Obtaining a Death Certificate

The percentage of people getting death certificates has increased every year (Figure 5). This percentage increased from 27% (2014) to 64% (2018). The increase in death certificates obtained by the people from year to year is a positive thing. Death certificates are important documents that have a legal impact on various civil rights of citizens. Death certificates can only be issued if there is no dispute regarding a person's death; in other words, the death is reasonable. If a person's death is not reasonable, such as in a suspected criminal act or negligence of another party, a death certificate can only be issued after all forensic examinations have been completed.

It is important for doctors who first find a case of death to sort out whether the death case is natural or unnatural. Good data retrieval using verbal autopsy forms is very helpful to address this issue. The availability of sufficient data from reliable sources determines the results of the analysis of a verbal autopsy. By using a good verbal autopsy form, it is expected that doubts about sudden death or death on arrival can be reduced. The rights of the deceased population and the rights of their families can also be well protected. Delay in one death investigation process will affect the next process, and will ultimately hamper the fulfilment of the rights of the families of the deceased population.

There were deaths from intentional injuries, one of which was a homicide. Several researchers have reviewed various risk factors for killing. Gun murder is more common in areas with access to firearms. Drug and alcohol consumption can also influence a person to get involved in a fight. Involvement in gang activities and drug trafficking also increases the incidence of murder. Regions with high unemployment usually record-high homicide cases⁵.

Some studies have ranked accidental deaths at the top of unnatural deaths. The cause of accidents has been widely studied and found to differ between age groups. Accidents are even the most unnatural method of death in the elderly.⁶ Elderly people are more prone to injury because of declining health and dependence on others. Most cases of injury that caused death in the elderly are traffic accidents, followed by falls, and poisoning.⁷ The most common cause of injury due to accidents in children was falls followed by bites.⁸ Individuals who work can have accidents, even for productive age groups. No differences were found regarding the factors of being too tired from work.⁹ Accidents also differed in pattern

between urban areas and non-urban areas. Poisoning occurred more frequently in rural areas. Most cases of poisoning were due to kerosene as the agent. In urban areas, most injuries are caused by foreign objects.⁸ The use of narcotics such as cocaine can increase the risk of death from injury in accidents.¹⁰ Alcohol consumption also increases the risk of accidents.¹¹

Urban areas have higher traffic accident rates than rural areas. Malik et al¹² found traffic accidents as one of the highest contributors to injury rates with 25% of cases occurring in rural areas and 74% in urban areas. Subjects who work have a higher risk of having accidents while working and accidents while travelling to and from work.¹³ Fazel et al¹⁴ found that individuals who did not work would spend more time at home, so they would more likely be involved in accidents near home. Housewives have a higher risk of injury and death due to accidents at home.

The researchers revealed that countries with a lower-middle income (or low-and-middle-income countries or LMIC) in Southeast Asia in 2012 had the highest suicide rates among countries with other middle to lower-income countries.¹⁵ Globally, suicide rates in LMIC occur mostly in the 30-49-year-old group, whereas in countries with high incomes, the most suicides occur from the age of 15-29 years. The incidence of suicide increases with increasing age in the elderly group and more prevalent in men than women.¹⁶ Stigma towards patients with suicidal problems and limited access to medical services increases the risk of suicide in this group. The urge to commit suicide can occur in someone in a conflict or war situation.¹⁷

Minority groups are vulnerable to discrimination and stigma, which are also risk factors for suicide. The trauma experienced is a major stressor for vulnerable individuals. Trauma can be caused by torture or abuse, and severe situations such as financial or academic problems.¹⁸ Suicides in agrarian rural areas are often caused by financial problems due to crop failure, debt, and poor socioeconomic conditions.¹⁹ The risk of suicide in urban areas is influenced by marital status, income, ethnicity, and psychiatric status.²⁰ Based on the level of education, the higher the level of education the lower the suicide rate.²¹

Unnatural deaths can also occur within the household. One of the risk factors for intimate partner violence (or Intimate Partner Violence or IPV) is the

patriarchal view of the community. The level of IPV for women in countries that follow a patriarchal system is quite high.²² The prevailing norms consider men to be superior. Inequality with partners in terms of income or education level makes men feel less confident.²³ IPV is more common in households experiencing financial difficulties.²² Excessive alcohol consumption can increase the risk of IPV.²³

Data on the number and causes of death that are valid and reliable is crucial for use as the basis for the formulation, development, monitoring, and evaluation of a policy. In areas where many deaths occur outside health facilities, and areas that have poor civil registration systems, it is probable that cases of death are not recorded and do not get death certificates.

Verbal autopsy is a technique used to determine the cause of death by asking caregivers, friends or family members about the signs and symptoms that were shown by the deceased before death. Data mining is carried out using a standardized questionnaire by collecting signs, symptoms, complaints, and any medical history or events. This is done to explain the cause of death at the community level or population level where no death registration was completed with a medical certificate or in the case that was registered, the numbers were limited.²⁴

Conclusion and Acknowledgement

Verbal autopsy HDSS has succeeded in distinguishing between natural and unnatural deaths in several deaths in Sleman Regency. Besides, it also distinguished various types and mechanisms of occurrence of death. However, there are still indeterminate cases.

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Conflict of Interest, SOURCE of Funding and Ethical Clearance

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Conflict of Interest- Nil.

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