ANALYSIS OF THE CAUSES OF DEATH IN INDONESIA DUE TO ACCIDENT BASED ON THE SAMPLE REGISTRATION SYSTEM FROM 2014 TO 2016

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ABSTRACT

Background: Traffic accidents in Indonesia (dominated by motorbikes) are a serious problem because they cause many injuries and deaths at productive age. The sample Registration System (SRS) produces an overview of the causes of death nationally including a description of the causes of death due to accidents. The purpose of this study is to analyze the causes of death due to accidents based on the characteristics of age, sex, place of death, and type of accident.

Subjects and Method: A cross-sectional was selected to be this study design. The SRS sample selection method is Probability Proportional to Size (PPS) using the 2008 Potential Village (PODES) survey data. SRS was conducted in 128 sub-districts spread over 119 districts / cities and in 30 provinces in Indonesia. SRS data are collected annually (January 1 to December 31), and the analyzed SRS data are 2014-2016. The cause of death was determined based on a questionnaire from the results of a verbal autopsy interview by the health center health worker to the family of the deceased. Determination of the cause of death by trained health center doctors according to the standards in ICD-10. The data were descriptively described.

Results: Transportation accidents were included in the top 10 causes of death. Most deaths occurred among adolescents aged 15-19 years. Mortality in men was higher than in women. Most of the deaths occurred in the hospital, followed by other places and on the way to the hospital / health facility. The most types of accidents were traffic accidents on motorbikes, pedestrians, and car accidents.

Conclusion: This study provides information to stakeholders to prioritize policies in an effort to reduce the incidence of traffic accidents, injuries, and deaths due to accidents in Indonesia. Relevant agencies need immediate and comprehensive handling.

Keywords: causes of death, verbal autopsy, vital registration, traffic accidents

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BACKGROUND

Traffic accident is a problem which received great attention, not only nationally but internationally. Various statistical data on the number of deaths caused by traffic accidents continue to increase until the year 2016 reaches as 1.35 million. The World Health Organization (WHO) gives their great attention to the problem of traffic accidents, where the most victims are children and adults aged 5-29 years. According to WHO (2018), this should not only have an impact on the problems of the population and public facilities but also have an impact on the nation's future generations because of the large number of people of productive age who died from accidents. Seeing the trend of cases that continues to increase from year to year, various good health agencies WHO see the need for clear and comprehensive steps

aimed at improving child safety, including neglect of safety in public transportation facilities.

The same thing can be found in Indonesia, the death rate due to traffic accidents is still getting great attention and is very worrying. In the year 2016 the Indonesian National Police released the number of accidents recorded as 106,431, where 31,170 of them died, 20,660 people had severe injuries, and 120.700 were slightly injured. The productive age range or the age of 15-19 years is the age group that tends to be the most vulnerable to traffic accidents where 25,468 people are victims of various types of accidents (Korlantas Polri RI, 2017). According to Djaja et al., (2016) explained that the level of vulnerability to traffic accidents in Indonesia is dominated by areas that have a large population with large traffic levels such as West Java, Central Java, East Java, Sumatra. North and DKI Jakarta.

The increase in the volume intensity of motorized vehicles, especially two-wheeled vehicles, also contributes greatly to the increased risk of traffic accidents. In 2014, it is estimated that the burden of disease due to traffic accidents in Indonesia is the second highest; namely the loss of productive year of 3,876.280 years (Disability Adjusted Life Years' Loss/ Daly's Loss).

In April 2013, the President of the Republic of Indonesia issued Presidential Instruction Number 4 of 2013 concerning the Decade of Action Program for Road Safety 2011-2020 after the government established the National General Plan for Safety (RUNK) in Jakarta May 2011 which is in line with the United Nations Program, Decade of Action (DoA) for Road Safety 2011-2020 as stated in UN Resolution No.64/255 2010 (Ministry of Health of the Republic of Indonesia, 2013).

Declaration of Decade of Action for Road Safety 2011-2020 which concentrates on efforts to control and reduce the level of danger from road traffic accident victims globally through increasing awareness of traffic compliance in the agenda on a national, regional and global scale. Various steps to increase awareness of orderly traffic are also being intensified throughout the world, not only in developing countries, but also in developed countries. In Indonesia, accidents and deaths are recorded by the Traffic Corps (Korlantas) of the Indonesian Police, but if the victim dies at the hospital it will be recorded by the hospital. Currently the hospital data has not been integrated with the Korlantas data system.

The Sample Registration System (SRS) conducted by the Indonesian Health Research and Development Agency produces data on causes of death nationally including causes of death due to accidents. This paper aims to analyze the causes of death due to accidents based on the characteristics of age, sex, place of death and type of accident on the results of the SRS year 2014-2016.

SUBJECTS AND METHOD

1. Study Design
This was a cross-sectional study with a descriptive analytic method.

2. Population and Sample
The population in this study were the entire population in Indonesia. The sample selection method in this study uses Probability Proportional to Size (PPS). Indonesia was divided into cities (representing urban areas) and districts (representing rural areas). Using data from the Village Potential Survey (PODES) 2008, a number of sub-districts in the city and district were identified. Indonesia was grouped

into Cities (representing urban) and District (representing rural areas) using the PODES Survey data.

Estimates of the total sample population are needed to SRS is a minimum of 2% of the total population (Projected from the Census of Population 2000: 231,114.483), i.e., 4,622.290. To achieve this sample size, a total of 25 districts in cities and 103 sub-districts in Indonesia's districts selected were systematically as SRS Areas. The average total population of the sub-districts is 36,033 and the total selected SRS sites of at least 128 sub-districts were selected as the administrative level for the SRS sample locations, as they are the lowest administrative unit with defined boundaries in cities or districts covering one or more Community Health Centers. The SRS sample is 128 sub-districts spread over 119 districts / cities and in 30 provinces in Indonesia.

3. Study Variables
Study variables of this study consisted of age, gender, place of death and cause of death.

4. Study Instruments
Verbal autopsy questionnaire consists of three types: a questionnaire for cases of neonatal (age 0 to28 days), the questionnaire for the case of infants and children (aged>28 days until <12 years) and a questionnaire to the case of adults (age ≥ 12 years). The research instrument used for the interview was the WHO version of the verbal autopsy questionnaire.

5. Research Flow
SRS research is to record the incidence of death and birth in the sample area. The incidence of death recorded in the SRS is all deaths that occurred in the SRS sample area, whether they occurred at home, or in the route to a health facility or occurred in a health facility. Information on the incidence of death and birth is obtained from the head of the Neighborhood/ Hamlet/ Village/ Urban village/ Sub-district or health cadre who reports to the selected community health center. The information that has been obtained by the community health center is then recorded on form 5 (data on mortality) and form 4 (data on births).

After the death information is obtained, the trained midwife / nurse at the health center conducts interviews using the verbal autopsy method (AV) to the family of the deceased or the person who knows best about the history of the disease, the symptoms and signs experienced by the deceased and the treatment received by the deceased. The interview ideally be conducted after 40 days of the death or after the grief period has passed. After the questionnaire is completely filled, the questionnaire will be given to the community health center doctor for a resume and a diagnosis of the cause of death based on ICD-10.

Determination of the diagnosis of cause of death based on AV results is carried out by a trained community health center doctor. The causes of death included on the medical certificate as the cause of death are all diseases, health conditions or injuries that caused or caused death and the circumstances of the accident or violence that caused the injury. Writing the causes of death based on the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Second Edition.

AV questionnaires that have been completely filled in at the health center will be sent periodically to the person in charge of operations (PJO) at the district / city health office and then the question-

naire is sent to the Health Research and Development Agency. Furthermore, the AV questionnaire carried out data entry, data cleaning and data analysis.

6. Data Analysis
Data collected deaths per year, from 1 January to 31 of December. Data analysis was carried out annually by the SRS research team using univariate and bivariate analyzes to obtain a description of the causes of death.

Table 1, shows that transportation accidents are included in the top 10 causes of death. In the 2014 and 2015 SRS, transportation accidents were in the eighth rank of the leading causes of death (2.6%) while in the 2016 SRS there were the ninth most causes of death (2.6%).

Table 1. Ten Leading Underlying Causes of Death (Males & Females), Indonesian SRS, 2014-2016

Cause of Death (ICD 10)	Sequence of Causes of Death		
	2014	2015	2016
Cerebrovascular diseases (I60 - I69)	1	1	1
Ischemic heart diseases (I20 - I25)	2	2	2
Diabetes mellitus with complication (E10 - E14)	3	3	3
Respiratory tuberculosis (A15 - A16)	4	6	5
Hypertensive diseases with complication (I11 - I13)	5	4	4
Chronic lower respiratory diseases (J40-J47)	6	5	6
Diseases of the liver (K70 - K76)	7	7	14
Transport accidents (V01– V99)	8 (2.6%)	8 (2.6%)	9 (2.6%)
Pneumonia (J12 - J18)	9	9	16
Diarrhea and gastroenteritis of presumed infectious origin (A09)	10	10	12

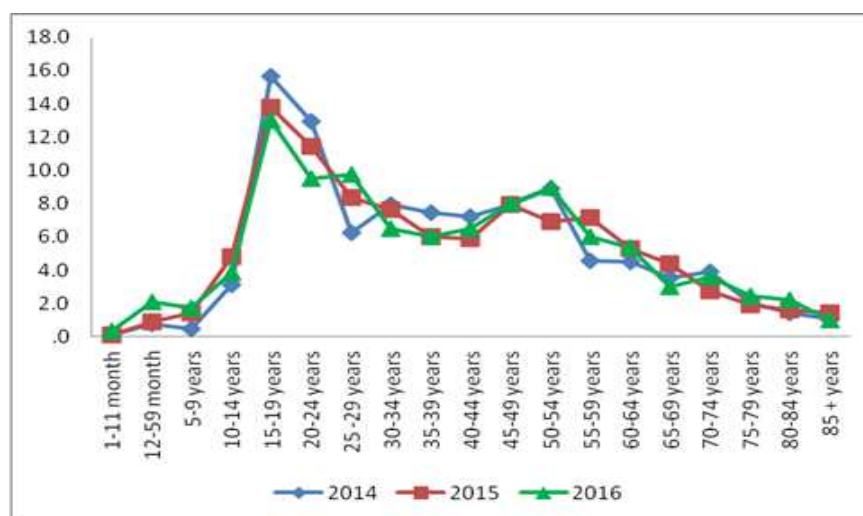
Figure 2: Distribution of Mortality due to Transport Accidents by Age Group, Indonesian SRS, 2014-2016

Figure 2, shows the distribution of deaths due to transportation accidents by age group in SRS 2014-2016. Most deaths occurred in the age group 15-19 years as many as 15.7%, 13.8% and 13.0%. In the 2014 and 2015 SRS, the second highest cause of death occurred in the 20–24-year age group as much as 12.9%, 11.5%, while in the 2016 SRS in the 25-29 age group it was 9.5%.
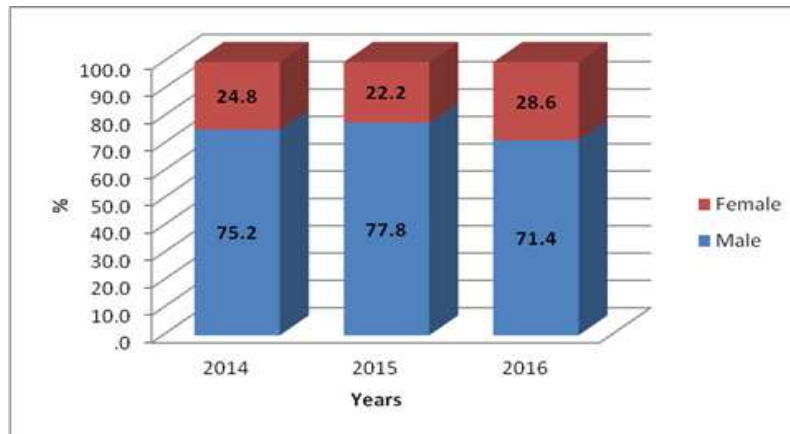

Figure 3: Distribution of Mortality due to Transport Accidents by Sex, Indonesian SRS, 2014 - 2016

Figure 3, shows the distribution of deaths due to transportation accidents by sex in SRS 2014-2016. Most of the deaths occurred in men as much as 75.2%, 77.8% and 71.4%.
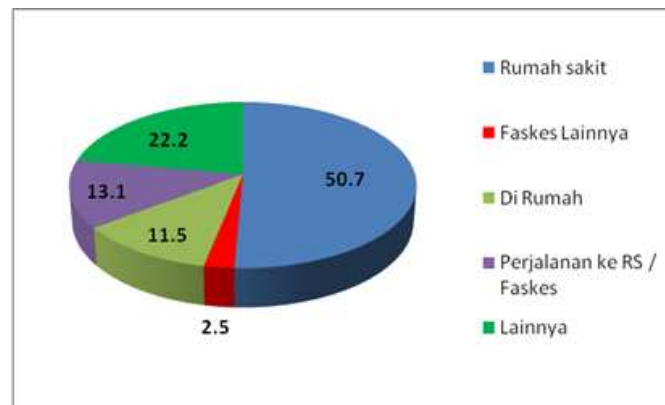

Figure 4: Distribution of Mortality due to Transport Accidents by Place of Event, Indonesian SRS, 2016

Figure 4, shows the distribution of deaths due to transportation accidents by place of death in SRS 2016. The highest proportion of deaths occurred in hospitals (50.7%), followed by on-site others (22.2%) and on the way to the hospital / health facility (13.1%).
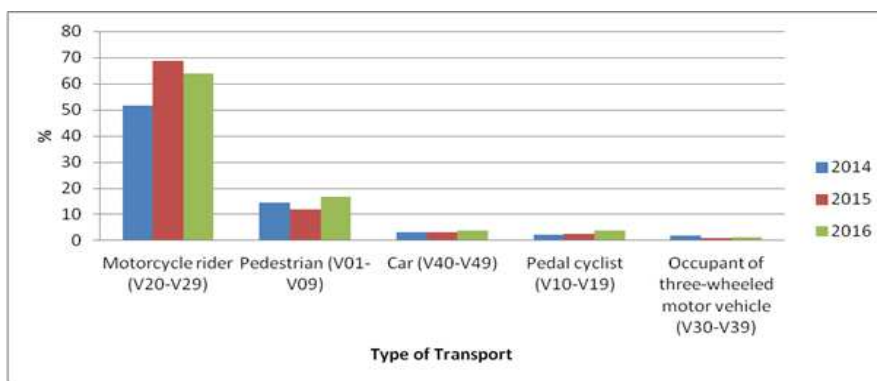
Figure 5: Distribution of Injury Mortality by Type of Transport (Males & Females), Indonesian SRS, 2014-2016

Figure 5, shows the distribution of deaths due to transportation accidents by vehicle type in the 2014-2016 SRS. The highest prevalence of deaths occurred among motorcyclists, followed by pedestrians, motorists, cyclists and passengers of three-wheeled vehicles. The prevalence of death among motorcyclists was 51.7%, 68.7% and 64.0%. The prevalence of mortality in pedestrians was 14.6%, 12.0% and 16.9%.
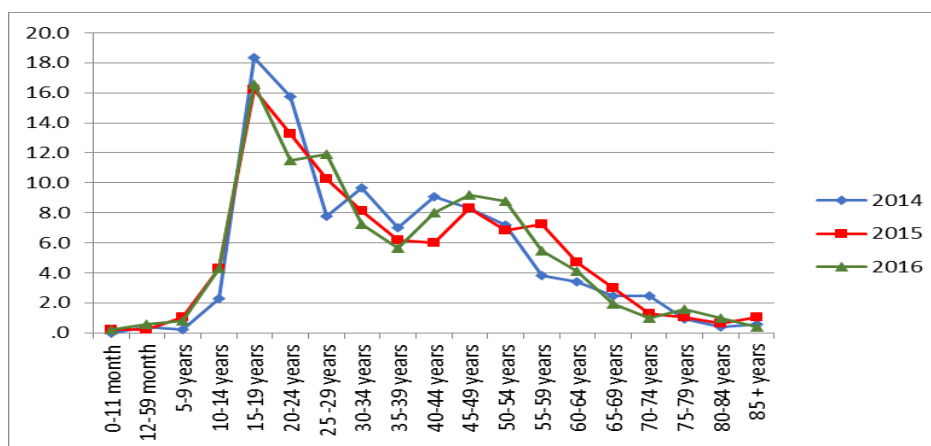

Figure 6: Distribution of Mortality due to Motorcycle Accidents by Age Group, Indonesian SRS, 2014 – 2016

Figure 6, shows the distribution of deaths due to motorbike accidents by age group in SRS 2014-2016. Most deaths occurred in the age group 15-19 years as much as 18.4%, 16.2%, 16.6% followed by the 20–24-year age group as much as 15.7% and 13.2% in the 2014-2015 SRS while in the 25-29 age group as much as 11.9% in SRS 2016.
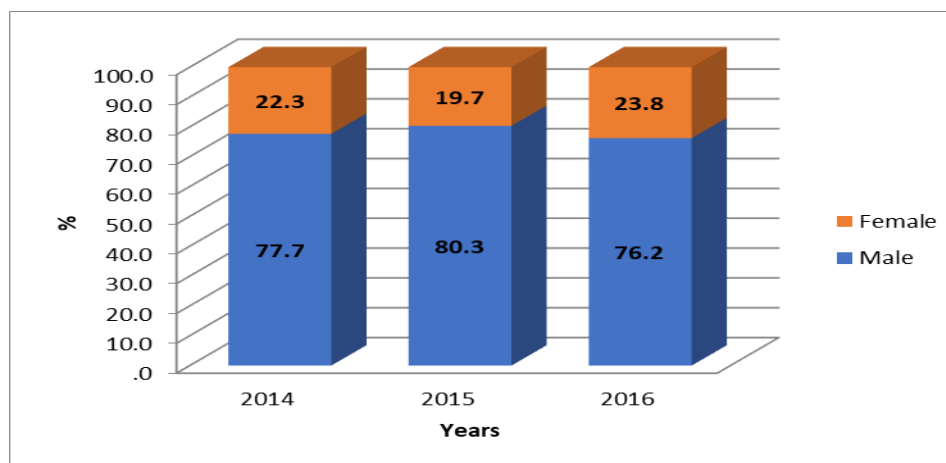
Figure 7: Distribution of Mortality due to Motorcycle Accidents by Sex, Indonesian SRS, 2014 - 2016

Figure 7, shows the distribution of deaths due to motorbike accidents by sex in SRS 2014-2016. Most of the deaths occurred in men as much as 77.7%, 80.3%, and 76.2%.

DISCUSSION

Countries in Southeast Asia contribute over 20 % of traffic accidents to deaths. In fatal traffic accidents in Thailand, Indonesia, Malaysia motorbike users account for 60% or more. In the United Kingdom and United State, the fatality rate is around 10 %, while in Korea and Japan the fatality rate is around 10-20%. The analysis of accident events shows that there is a relevance between the number of motorized vehicles and the high mortality due to traffic accidents (Esmael et al., 2013).

The results of the 2014-2016 SRS show that transportation accidents are among the top 10 causes of death in Indonesia. Economic growth in Indonesia has increased the demand for transportation and vehicle ownership. The large population of motorbikes in Indonesia has an effect on the high proportion of accidents involving motorcyclists. 2014 data shows that of the 113 million total vehicles regis-

tered in Indonesia, more than 81% are motorbikes. Motorbikes dominate the number of traffic accidents in Indonesia which result in fatalities and serious injuries. Motorcyclists account for 73% of deaths and major injuries in traffic accidents in Indonesia (Santosa et al., 2017). This data shows that growth and motorized vehicles have a direct correlation with the number of deaths in traffic accidents in Indonesia.

Deaths due to transportation accidents occur mostly among adolescents in the 15-19 age group and followed by the 20−24-year age group. Young drivers lack driving experience and are usually not fully aware of the impact of risky driving behavior. This is in accordance with the Organization for Economic Co-operation and Development and the World Health Organization in 2018 that many traffic accidents occurred in the age range of 26-30 years where many accidents occurred to motorcyclists. The most direct cause of death due to traffic accidents is due to head trauma, the prevalence of accidents due to motorbikes has increased from 25.9% to 47.7% compared to other means of transportation (RI Health Research and Development Agency, 2013).

The death rate caused by traffic accidents continues to attract the attention of various parties in Indonesia and in the world. Based on the results of the SRS, it was found that most deaths occurred in young men than women. According to studies (Setyowati et al., 2018) this is because men are more likely to disobey existing regulations, while women are more likely to obey existing regulations.

The SRS results show that the death rate in men is 3 times higher than that in women. This result is also in line with a study conducted in a province in Iran which states that the average age of men who experience traffic accidents is 39 years and women have an average age of 41 years where men die more than women (Izadi et al, 2016). Globally, deaths due to traffic accidents are almost three times more common among men (2.7) compared to women. A study at 6 major hospitals in Barcelona, Spain found that 7 out of 10 road traffic accident cases over the age of 14 years were male, and that the overall death rate was more than 3 times higher for men (26.0) than women (7.7) (WHO, 2002). Injury and death rates for men are higher for each category of traffic injury victims in some developing countries.

The results from Burden of Disease years 2019 also show that the incidence of traffic accidents begins to increase in the age group 10-14 year and has the highest increase in the age group 20-24 year where it is more common in males. than women. The role of the education sector is very necessary considering that the increase began to occur in adolescence and at that age children should not have a driving license. It is necessary to be firm in the application of these rules. This can be done by tightening the rules for carrying vehicles for students and also providing school materials that explain death victims caused by traffic accidents where teenagers or students are the victims of the most traffic accidents with a high level of fatality (Shirzad, 2012).

The results of the SRS show that the most deaths occurred in the hospital followed by other places and on the way to the hospital/ health facility. It is necessary to conduct further evaluation regarding the number of deaths that have occurred in the hospital, whether due to the type of injury that cannot be treated or because other reasons (Kibayashi et al., 2014).

The most types of accidents are traffic accidents on motorbikes, pedestrians and car accidents. Road traffic accidents (dominated by motorbikes) are a major cause of injury loads and this rate is consistently high (Koroma et al., 2019). Currently, road traffic injuries cause about 30,000 annual deaths nationwide. Motorbikes are a major challenge in driving safety in Indonesia. Motorcycle users make up 60% or more of deaths from road accidents (Nastiti, 2017).

Death due to traffic accidents has become a threat to society, not only in Indonesia but also the world community (Micheale, 2017). Indonesia has the highest rate of road traffic accidents among the comparison countries. This will have an impact on the population level and the sustainability of the nation's generation so that a successful multi-sectoral approach is needed to reduce traffic injuries, including road safety engineering, traffic calming, segregation of pedestrians from traffic, seat belt & helmet law enforcement, and enforcement. vehicle safety standards. Efforts are also needed to increase the role of each related sector, reduce risk factors and reduce the impact of traffic accidents; involving injuries and died (Bello et al., 2012).

Increasing public awareness of the magnitude of the traffic accident problem is needed. Socialization related to safe and comfortable driving for all road users must be carried out in a sustainable manner. Road rules should be obeyed by all road users. There is also a need for assertiveness from the authorities in enforcing rules on roads indiscriminately and consistently.

The rapid development of technology has been followed by an increase in the number and types of vehicles in Indonesia, however, this seems not to have been followed by the availability of adequate mass transportation facilities, so that private vehicles have increased sharply. The urbanization factor according to Bolbol and Zalat (2018) has a serious impact on the inability of transportation services which has made the use of two-wheeled vehicles to increase as well and are widely used throughout the world as an easy mode of transportation (Olubomehin, 2012). In several developing countries, one of which is Egypt, the density of traffic is overcrowded where trucks, motorbikes, wheeled vehicles and buses and pedestrians use the same roads (Shaker et al., 2014). Various studies have shown traffic accidents using motorized motorbikes to be a fairly complex public health problem but neglected in several factors such as neglected driving safety which results in a significant increase in traffic accidents (Shaker et al., 2014) than that of two-wheelers also have a greater risk of accidents compared to other vehicle types (Lin and Kraus, 2009; Tumwesigye et al., 2016; Bolbol and Zalat, 2018).

Williams (2003) explains that the mortality rates occur from accidents by using the two-wheeled experienced greater by men and teenagers as well as data provided by the WHO and the World Bank if not taken an action that is required in the year 2020 especially in countries have a high vehicle volume increase (Cameron, 2004).

WHO (2017) explains that the vulnerability of motorcyclists to traffic accidents is very high. When compared with developed countries, deaths due to traffic accidents are at 12 %, while in developing countries it is bigger, namely at the percentage of 26 %.

Looking at the data above, it is realized that safe driving skills are needed that must be implemented so that the accident rate in Indonesia can be reduced. Based on the results of this study, it was found that one of the factors that cause traffic accidents is caused by reckless drivers. This driving behavior does not only endanger yourself but also endanger other road users, so driving safely is necessary to reduce the number of deaths due to traffic accidents.

The vital registration system is useful for monitoring the impact of health programs and obtaining better quality information. With good data sources and proper data collection, data on mortality and causes of death is evidence that can be used as a basis for formulating health program policies. One of them is for planning health policies to improve the health and safety of driving in Indonesia. Completeness of data and integration of accident data across sectors still needs to be improved. The conclusion from this research is that traffic accidents in Indonesia are still a very serious problem because they cause many injuries and deaths at productive age. Relevant agencies need immediate comprehensive and comprehensive handling in an effort to reduce the incidence of traffic accidents, injuries and deaths due to accidents in Indonesia.

In particular we can conclude some of the following:

1. The cause of accidental death into 10 great cause of death in Indonesia and have not shown a significant decline from the year 2014 until 2016.
2. The proportion of deaths was highest in the age group productive (15-19 years), followed by the age group 20 to24years old and 25-29 years old.
3. Male deaths occurred 3 times more than women.
4. The highest prevalence of deaths occurred among motorcyclists, followed by pedestrians, motorists, cyclists and passengers of three-wheeled vehicles.

The government has further tightened the conditions for the use of motorbikes in school age groups and has given more strict sanctions against rule breakers. Education about traffic rules for school children starting from Kindergarten to High School as an extracurricular subject (School Health Unit/UKS) can be a good step to help reduce the rate of traffic accidents, especially for teenagers who are the most victims. In addition, in order to complete accident data in Indonesia, it is necessary to integrate data between the health sector and the police so that complete and valid data on accidents and causes of death due to accidents are obtained.

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