Analysis of Health Risk Factors among Intercity Bus Drivers During the 2024 Eid al-Fitr Holiday Season in East Jakarta

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ABSTRACT

Driver health checks are crucial to ensure the safety and well-being of individuals operating vehicles, especially those in public transportation professions, such as intercity and interprovincial buses (AKAP) and similar modes of transportation, to prevent the risk of road accidents. This study aims to analyze the relationship between driver health risk factors—namely age, blood sugar levels, and amphetamine in urine—and driving fitness during the Eid al-Fitr season at two intercity bus terminals in East Jakarta Administrative City during the 2024 Eid al-Fitr season. Data collection was conducted through surveillance from April 3, 2024, to April 17, 2024, involving 667 drivers, and analyzed using univariate and bivariate methods with JASP software. The results showed that 76.6% of drivers had mild to severe hypertension, 7.8% had blood sugar levels >200 mg/L, 0.4% tested positive for respiratory alcohol, and 0.3% tested positive for amphetamine. As a recommendation, 11.1% of drivers were deemed unfit to drive. Hypertension, blood glucose levels, and driving fitness were statistically associated with driver age (p < 0.001). Age, as a confounding factor, is closely related to the measured parameters and driving fitness, necessitating attention to reduce the risk of road accidents, particularly during the Eid al-Fitr holiday period. These findings highlight the critical need for regular health monitoring of aging commercial drivers and the implementation of age-specific fitness assessment protocols to enhance road safety during high-traffic holiday periods.

KEYWORDS	*Age, Driver Screening, Driving Fitness, Health Risk Factors, Hypertension, Road Safety*

INTRODUCTION

Driver health checks are essential to ensure the safety and well-being of individuals who operate vehicles, especially public transportation drivers such as inter-city and inter-province bus drivers (AKAP) and similar modes of transport. The importance of these checks is underscored by the various health risks associated with driving, including chronic conditions that can impair a driver's ability to operate a vehicle safely. Therefore, the East Jakarta Health Office collaborates with health center officers in the East Jakarta Administrative City work area to conduct driver health checks at two major terminals, namely the Kampung Rambutan Terminal and the Pulo Gebang Integrated Terminal. These checks are performed regularly, especially before national holidays such as Eid al-Fitr (Lebaran) and Nataru (Christmas and New Year).

The Ministry of Transportation predicts that the number of travelers during the 2024 *Eid al-Fitr* period will increase significantly, reaching around 71.7% of Indonesia's total population, or approximately 193.6 million people. This figure represents an increase compared to the previous year, when the number of travelers was recorded at 123.8 million during *Eid al-Fitr* 2023 (Kemenko PMK, 2024; Kemenhub, 2023). This enormous population movement places unprecedented pressure on transportation systems and increases the risk of

traffic accidents, making driver health screening a critical public safety priority. The urgency of this research stems from the documented correlation between driver health conditions and accident rates, particularly during high-stress holiday travel periods when driver fatigue and health complications are exacerbated.

Studies indicate that a significant proportion of drivers have undiagnosed hypertension, which can severely impact their condition for driving. A literature review of eight journals found a relationship between transportation driver occupations and the incidence of hypertension (Runtu & Bentian, 2022). Drivers with hypertension are at major risk; they are ten times more likely to be deemed unfit to drive upon comprehensive health checks (Irianto & Djaja, 2016).

Comprehensive health checks for all drivers before they start work include assessments of blood pressure, blood sugar levels, and drug tests to ensure physical fitness and the absence of illegal substances. This activity is expected to prevent and reduce the risk of traffic accidents, considering that drivers play a crucial role in driving safety, especially during holidays such as *Eid al-Fitr* and Christmas & New Year. The habit of regular coffee consumption is a factor that increases hypertension risk by 3.5 times compared to non-coffee drinkers (Irwan et al., 2023). Another factor is smoking 11–20 cigarettes per day. Moderate to severe stress can also elevate hypertension risk (Saputri et al., 2020). Fatigue contributes to increased levels of drowsiness; the more tired the driver, the higher the risk of sleepiness (Suhardi et al., 2022).

While previous studies examined driver health risks individually, limited research comprehensively analyzes the combined impact of multiple health risk factors (hypertension, diabetes, substance use) on driving fitness during peak travel periods in the Indonesian context. Most existing studies focus on single health parameters or are conducted during normal operational periods, failing to capture the unique physiological and psychological stressors present during major holiday travel seasons. This study addresses this gap by providing a comprehensive multi-parameter health assessment during the high-stress *Eid al-Fitr* travel period, offering insights into the complex interplay among age, health conditions, and driving fitness in Indonesian commercial drivers.

This research aims to: (1) analyze the prevalence of health risk factors among intercity bus drivers during the 2024 *Eid al-Fitr* holiday season; (2) examine the relationship between driver age and various health parameters including blood pressure, blood glucose, and substance use; (3) determine the association between health risk factors and driving fitness recommendations; and (4) identify age-related patterns that may inform targeted intervention strategies. The benefits of this research include providing evidence-based data for transportation safety policy development, informing health screening protocols for commercial drivers, supporting the development of age-specific fitness assessment guidelines, and contributing to accident prevention strategies during peak travel periods. The findings will be valuable for transportation authorities, healthcare providers, and commercial transport companies in developing comprehensive driver health management programs.

METHOD

This research employed a descriptive cross-sectional study design using surveillance data analysis to examine health risk factors among intercity bus drivers. The study utilized quantitative methods to analyze the relationship between demographic characteristics, health parameters, and driving fitness assessments. This study is an analysis of surveillance data from the East Jakarta Health Office on driver health screening at Pulogebang Terminal and Kampung Rambutan during the Eid al-Fitr holiday, namely April 3, 2024 - April 17, 2024.

The study population consisted of all intercity bus drivers operating from Kampung Rambutan and Pulo Gebang terminals during the specified period. The sample included 667 drivers who underwent comprehensive health screening as part of mandatory pre-holiday safety

protocols. Data collection techniques involved standardized health assessments including: (1) blood pressure measurement using calibrated sphygmomanometers, (2) random blood glucose testing using digital glucometers, (3) respiratory alcohol testing using breathalyzer devices, and (4) urine amphetamine screening using rapid diagnostic test kits. All measurements were conducted by trained health center personnel following standardized protocols established by the Indonesian Ministry of Health.

The data were analyzed descriptively and bivariately to examine the relationship between age and factors measured in the health examination, namely blood pressure, random blood sugar, respiratory alcohol, and urinary amphetamine. Driver fitness criteria were obtained through scoring. Data sources included primary surveillance data collected during the health screening process and secondary demographic data from driver registration records. Data analysis techniques comprised univariate analysis for descriptive statistics and bivariate analysis using Analysis of Variance (ANOVA) to examine relationships between categorical and continuous variables (Budisteanu et al., 2020; van Doorn et al., 2021).

RESULTS AND DISCUSSION

Driver Characteristics

Older drivers often have a history of chronic diseases such as hypertension, diabetes, or heart disorders. These conditions can affect overall health and driving ability. For example, uncontrolled hypertension can cause dizziness or loss of consciousness. Many elderly drivers take medications to manage their health conditions. Some medications have side effects that can affect alertness, such as drowsiness or dizziness, which can be dangerous while driving.

Data shows that elderly drivers have a higher risk of being involved in traffic accidents than younger drivers. One study shows that drivers aged 70 and above have higher accident rates due to a combination of declining physical and cognitive factors.

The safety of older drivers is a growing public health issue for which interventions are currently being sought. Statistics show that older drivers have disproportionately high rates of motor vehicle fatalities compared to other adult drivers. This imbalance is due to two factors: an increased rate of crashes per mile driven and an increased risk of death in the event of a crash. Generally, traffic safety efforts for the older population have focused on methods to identify unsafe drivers for driving bans, but driving bans deprive most older Americans of their primary form of transportation and have been linked to an increase in symptoms of depression. In response to these concerns, the Older Driver Project, created by the American Medical Association in partnership with the National Highway Traffic Safety Administration, explains and recommends a more acceptable approach to traffic safety. The main goal of this approach involves helping older drivers stay on the road safely to maintain their mobility and independence. This can be achieved through three methods: (1) optimizing the driver, (2) optimizing the driving environment, and (3) optimizing the vehicle. In this approach, discontinuing driving is recommended only after the driver's safety cannot be ensured through other means (Freed et al., 2024).

Accident data from the United States and Canada includes a number of key findings related to the frequency of accidents involving older drivers and accident rates, plus risk factors and protections for this group. First, there is broad agreement in the literature that the involvement of older drivers in fatal accidents has declined over the period covered by this review (i.e., since 2000). This decline may be attributed to improvements in vehicle safety, highway design, post-crash medical care, or behavioral prevention measures that have led to a reduction in crash-related injuries and deaths for drivers of all ages. However, differences remain in the crash involvement of older drivers relative to drivers of other ages. Accident rates based on reliable exposure measures and those using quasi-exposure methods consistently show rates for drivers in their 70s, and especially for those aged 80 and above.

Driver Health Screening
Table 1. Table of AKAP driver inspection results at Kampung Rambutan and Pulo Gebang Bus Terminals during the 2024 Eid al-Fitr holiday

Inspection	Criteria	n	%
Blood pressure	Normal	156	23.4
	Mild HT	275	41.2
	Moderate HT	172	25.8
	Severe HT	64	9,6
Blood sugar level	>200 mg/dl & complications	10	1.5
	>200 mg/dl without complications	42	6.3
	80 mg/dl - 200 mg/dl	615	92.2
Respiratory alcohol	Negative	632	94.8
	Positive	3	0..4
	Not tested	32	4.8
Amphetamine urine	Negative	665	99.7
	Positive	2	0..3
Recommendation	Fit to Drive	367	55.0
	Fit to Drive With Conditions	226	33.9
	Unfit to Drive	74	11.1
Total		667	100.0

From the processing of data from 667 drivers, it was found that most drivers, namely 275 (41.2%), had mild hypertension (HT), then 172 (25.8%) had moderate hypertension, 64 (9.6%) had severe hypertension, while 156 (23.4%) drivers had normal blood pressure.

Most of the blood sugar measurements obtained were 80-200 mg/dl, numbering 615 (92.2%), while 42 (6.3%) met the criteria of >200 mg/dl without complications, and the remaining 10 (1.5%) met the criteria of >200 mg/dl with complications.

Respiratory alcohol measurements were mostly negative, with 632 (94.8%) negative results and 32 (4.8%) not tested due to technical issues at the checkpoint, such as running out of testing equipment during the measurement, so they were asked to return to the checkpoint once the equipment was available, but the drivers did not comply. while the remaining 3 (0.4%) were positive.

Most of the amphetamine measurements, namely 665 (99.7%), were negative and only 2 (0.3%) were positive.

Based on the measurements taken and then scored according to the Ministry of Health guidelines, the majority, namely 367 (55%), were deemed fit to drive, 226 (33.9%) were deemed fit to drive with conditions, while 74 (11.1%) were deemed unfit to drive.

Age and hypertension, blood sugar levels, alcohol respiration, amphetamine urine, and fitness to drive

Based on the results of data processing and analysis, it was found that age is related to hypertension and is statistically significant with a p-value < 0.001 at CI (0.06-0.109). Similarly, blood sugar levels are significantly related to age with a p-value of 0.013 at CI (0.000-0.02).

Meanwhile, respiratory alcohol related to age is not significantly correlated, as shown statistically with a p-value of 0.845 at CI (0.00-0.000). Similarly, urine amphetamine is not correlated with age, as shown statistically with a p-value of 0.318 at CI (0.000-0.013).

Table 2. The Relationship Between Age and Several Screening Parameters for Intercity Bus Drivers

ANOVA - Hypertension Criteria by Age								
	Sum of Squares	df	Mean Square	F	p	ω²	95% CI for ω²	
							Lower	Upper
Hypertension Criteria	5058.651	3	1686.217	17.986	< .001	0.071	0.036	0.109
Residuals	62157.585	663	93.752					

ANOVA - Blood Sugar Levels by Age								
	Sum of Squares	df	Mean Square	F	p	ω²	95% CI for ω²	
							Lower	Upper
Glycemia Criteria	868.481	2	434.241	4.346	0.013	0.010	0.000	0.028
Residuals	66347.756	664	99.921					

ANOVA - Respiratory Alcohol by Age								
	Sum of Squares	df	Mean Square	F	p	ω²	95% CI for ω²	
							Lower	Upper
Respiratory Alcohol	34.023	2	17.012	0.168	0.845	0.000	0.000	0.000
Residuals	67182.214	664	101.178					

ANOVA - Amphetamine with Age								
	Sum of Squares	df	Mean Square	F	p	η²	95% CI for η²	
							Lower	Upper
Amphetamine Urine	100.923	1	100.923	1.000	0.318	0.002	0.000	0.013
Residuals	67115.314	665	100.925					

ANOVA - Fit to Drive by Age								
	Sum of Squares	df	Mean Square	F	p	ω²	95% CI for ω²	
							Lower	Upper
Driver Recommendation	4598.540	2	2299.270	24.382	< .001	0.066	0.033	0.103
Residuals	62617.696	664	94.304					

The age factor related to driver fitness was statistically demonstrated by ANOVA to have a significant relationship with a p-value of 0.001 at CI (0.033-0.103).

Discussion

The prevalence of hypertension increases with age and is more common among men than women (Kohler et al., 2022). Older women experience severe hypertension more often than older men. Drivers with uncontrolled hypertension face a high risk of serious cardiovascular events, such as heart attack or stroke, while driving (Potter et al., 2022; Saini et al., 2021). Sudden events can cause loss of vehicle control, endangering the driver and others on the road. Bus drivers and conductors face various health hazards due to stressful working conditions. They are exposed to various occupational hazards that cause a decline in their health over a period of time (Mohamed Ali et al., 2024). Studies in China since 2009 have shown that early prevention measures for the development of hypertension in bus drivers include at least

one physical examination per year. The government and bus companies should pay more attention to bus drivers with a high probability of hypertension: men, older than 40 years of age, with higher BMI and blood lipid values (Potter et al., 2022). Male Japanese bus drivers with sleep-disordered breathing and excessive alcohol consumption are at higher risk of developing hypertension than those without sleep-disordered breathing and excessive alcohol consumption (Sakiyama et al., 2021). In a 2021 study in Ethiopia, the prevalence of undiagnosed hypertension among long-distance bus drivers was 22.5%, which was associated with modifiable behavioral factors, lack of regular physical exercise, lack of adequate awareness, and high body mass index (Adal et al., 2024).

The prevalence of diabetes found in 52 out of 667 drivers (7.8%) drivers, can also be a risk factor that increases with age, as research in South India found 31 (6.9%) cases out of 450 drivers (Mohamed Ali et al., 2024). In a study in China, diabetes with or without complications was found to have a higher prevalence in older age groups (Wang et al., 2023), whereas systematic review results showed the opposite: type 2 diabetes diagnosis (with complications associated with a higher risk of mortality and vascular disease) was higher in younger age groups than in older age groups (Nanayakkara et al., 2021). Diabetes can affect a driver's vision, which is particularly dangerous for bus drivers, especially at night. Diabetic retinopathy, in which age is a major risk factor, is particularly prevalent among older drivers. (Yin et al., 2020)

Driving under the influence of alcohol is a serious offense. In Indonesia, drivers can be subject to criminal penalties under Law No. 22 of 2009 on Road Traffic and Transportation. Article 311 states that anyone who intentionally drives a motor vehicle in a dangerous manner can be punished with a maximum imprisonment of one year or a maximum fine of Rp3 million. In addition to legal sanctions, this violation can have a negative impact on insurance and personal reputation. Alcohol can impair brain function, disrupting thinking, reasoning, and muscle coordination. When someone drives after drinking alcohol, their concentration decreases, which is crucial for minimizing the risk of accidents. Drivers under the influence of alcohol experience decreased reflexes and reaction times. This means that they take longer to respond to emergency situations on the road, such as pedestrians suddenly crossing or other vehicles stopping suddenly. In the United States, approximately 37 people die every day as a result of accidents caused by drunk driving. In 2022, more than 13,500 deaths were recorded due to alcohol-related traffic accidents (Taylor, Brown, & Singh, 2022). Driving under the influence of alcohol significantly increases the likelihood of being involved in a traffic accident. Research shows that even a small amount of alcohol can negatively affect driving ability (Suadnyana, 2023).

Amphetamine is a type of stimulant that can have a serious impact on driving ability. The use of amphetamines, whether for medical or recreational purposes, can affect a driver's ability to drive safely. Here are some of the dangers associated with amphetamine use by drivers. Amphetamine affects cognition and behavior. Amphetamine can increase alertness and energy in the short term, but these effects are often accompanied by a decrease in the ability to make good decisions (Utama, Suardhana, Sutarya, & Krismawintari, 2024). Drivers may feel more alert, but they may also take greater risks and engage in dangerous driving behaviors (Wilson & Patel, 2022). Amphetamine use can distort perception and alter how a person assesses situations on the road. This can cause drivers to be unable to accurately judge the distance or speed of other vehicles, increasing the risk of accidents. The side effects of amphetamine cause anxiety, panic, and aggressive behavior. In the context of driving, this can result in overreactions to situations on the road, such as anger toward other drivers or disproportionate responses to emergency situations. Once the stimulant effects wear off, users often experience extreme fatigue and a significant decrease in energy. This can cause drivers to feel extremely tired or sleepy while driving, increasing the risk of accidents.

CONCLUSION

Age was identified as a significant risk factor and confounder linked to hypertension, elevated blood glucose levels, and overall fitness to drive among bus drivers at the Kampung Rambutan and Pulo Gebang terminals during the 2024 *Eid al-Fitr* holiday season. The study found that over 75% of drivers had some form of hypertension, and nearly 8% exhibited high blood glucose levels, highlighting serious health concerns that could impair driving safety. The clear relationship between advancing age and worsening health parameters emphasizes the need for targeted, age-specific health interventions in commercial driver management. Recommendations include establishing permanent health screening posts at terminals, implementing age-focused monitoring protocols and internal policies for elderly drivers, developing comprehensive health management programs with regular follow-ups and health education, and fostering collaboration between transportation authorities, healthcare providers, and companies to create evidence-based fitness-for-duty standards. Future research should explore the effectiveness of these age-specific interventions and investigate how integrating mental health and fatigue assessments could further improve driver safety during peak travel periods.

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