

## Election Officers' Health and Safety: An Occupational Risk Analysis

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**Abstract.** General elections are vital to democracy in Indonesia, yet the occupational health and safety (K3) of Voting Organizer Group (KPPS or election officers) officers is often overlooked. This study evaluates the impact of workload on the physiological health of election officers during the 2024 General Election using an ergonomics-based approach. Data were collected from seven KPPS members at TPS 07 Cerme Kidul, Gresik, East Java, measuring blood pressure and oxygen saturation before and after election day. The Wilcoxon Signed Rank Test revealed significant increases in blood pressure ( $p = 0.046$ ) and decreases in oxygen saturation ( $p = 0.047$ ) post-election. Key risk factors identified include long working hours, insufficient rest, and static positions. The study recommends interventions such as work shift rotations, extended rest periods, enhanced health screenings, and ergonomic improvements at polling stations. These measures aim to improve the health and safety of election officers, contributing to safer and more sustainable elections.

**Keywords:** Occupational Health, Fatigue, Risk Management, Elections, Blood Pressure, Workload

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### 1. Introduction

General Election (Pemilu) is the main pillar of democracy in Indonesia that guarantees people's participation in determining the direction of government. In the 2024 elections, millions of Indonesians will once again exercise their voting rights in a process that involves various elements, including the Voting Organizer Group (KPPS election officers) as the spearhead of the implementation of voting and counting at the polling station level. However, behind the euphoria of democracy, there are serious challenges that are often overlooked, namely the issue of Occupational Health and Safety (K3) for Election Officers [1], [2]. The public's participation in the general elections has been relatively high. The General Election Commission (KPU) stated that the voter turnout for the 2019 presidential election was 81.97%, and for the 2019 legislative election, it was 81.69% [2].

However, the high turnout "success" was not followed by a success in safeguarding the health and

safety of the Voting Organizer Group's (KPPS) personnel. Based on the Indonesian KPU data, as indicated by the Chairman of KPU, Arief Budiman, the number of polling station (KPPS) organizers who died in the 2019 elections was 894 and the number of officers who fell ill was 5,175. The workload of Election Officers is extremely heavy and the hours are long, i.e., up to 48 hours non-stop, which starts from preparation for the polling station (TPS) establishment [3].

Thirteen illnesses are known to be fatal, with the most prevalent conditions relating to heart issues, such as myocardial infarction, stroke, hepatic coma, and hypertension. Although the tasks assigned to Election Officers do not, by nature, endanger health, the adverse conditions may pose a health risk. Working long hours, adopting bad postures, and inadequate workspace are some of the factors leading to health hazards [4]. An ergonomic study on Election Officers in the latest 2024 elections is necessary to eliminate variables that lead to extreme fatigue at work [5]. The findings can help establish a safe, effective, efficient, pleasant, and health-safe polling station model.

This study aims to investigate the predictors of extreme fatigue among Election Officers. The elements under investigation include the physical work environment at voting stations, relaxation periods, and workload components [6]. The General Election Commission (KPU) reported that a total of 183 members of the 2024 election organizers, ranging from the sub-district level (PPK) to the KPPS level, passed away, as stated by the Chairman of the KPU, Hasyim Asy'ari, during an election evaluation meeting with Commission II of the House of Representatives (DPR). The Chairman also said that six sub-district election committees (PPK), 23 voting committees (PPS) and 183 Election Officers died in the 2024 General Elections [7].

Globally, the issue of labor protection in mass political activities is a concern in modern election management practices. The International Labour Organization (2024) has emphasized the importance of applying Occupational Health and Safety (OHS) principles in various types of work, including in the context of elections that require physical work, long working hours, and high psychological stress. A study in Afghanistan [8], shows that field officer fatigue in elections can be significantly reduced by implementing ergonomics-based policies and a well-structured work system. This confirms that Indonesia also needs to update its approach to human resource management in elections, not only in terms of administrative aspects, but also in terms of welfare and safety.

Previous research emphasizes the importance of TPS comfort to reduce fatigue, but has not measured health variables directly [9]. The human resource management techniques involved [10], [8]. Thus, there is still a void in the literature regarding empirical data-based occupational health risk analysis that directly links Election Officers workload with medical parameters such as blood pressure and oxygen saturation, which is then bridged by this study.

The novelty of this study lies in its approach of empirically combining occupational ergonomics and occupational health perspectives in the context of organizing elections in Indonesia-something that is still rarely explored in the national literature. Unlike previous studies that only highlighted the administrative or technical aspects of elections, this research specifically measured the impact of Election Officers work on health indicators such as blood pressure and oxygen saturation and identified ergonomic risk factors that trigger extreme fatigue. This study also pioneers in proposing an OHS risk management model applicable to large-scale political activities, making it relevant not only for the Indonesian context, but also as a contribution to the global discourse on occupational safety in electoral democracy.

This study aims to answer three key questions using an empirical approach and an ergonomic perspective to examine the causes of fatigue among Election Officers personnel and propose solutions to overcome them. The case study selected was KPPS 07 Cerme Gresik, East Java. Specifically, the questions are: (1) How have the KPU regulations of 2019 and 2024 reduced fatigue risk? (2) How can we solve this health hazard efficiently, practically, and independently? and (3) How can the solutions be applicable to reduce the risk of fatigue in the future?

This study aims to reduce the risk of fatigue among Election Officers, with a case study from KPPS 07 Cerme Kidul. Using empirical ergonomics and hazard ergonomic methods, the findings should inform the formulation of strategies to create a safer polling station for both Election Officers members and voters.

### *1.1 Occupational Health and Safety*

Occupational Health and Safety (OHS) is a discipline that deals with preventing work-related injuries and diseases and protecting and promoting workers' health [11]. It aims to improve workers' health by covering all aspects and variables that may affect the health and safety of employees and other stakeholders such as contractors, suppliers, visitors, and guests at work, as defined by OHSAS [12]. OSH aims to promote and maintain workers' highest level of physical, mental, and social well-being in all occupations. In this context, the fundamental principles of the process governing occupational risk assessment and management are the anticipation, recognition, evaluation, and control of hazards that arise in or from the workplace that could impair the health and well-being of workers [13].

### *1.2 Ergonomics*

"Ergonomics, derived from the Greek words 'ergon' (work) and 'nomos' (law), refers to the study of work systems and standards. While the term 'ergonomics' is used in Indonesia, other countries use alternative terms, such as 'bioengineering' in Scandinavia and 'human engineering' or 'human factors engineering' in the United States" [14], [15].

### *1.3 Hazards*

The approach to identifying hazards that is methodical, comprehensive, and organized is called hazard analysis [16]. When determining the safety of new systems or modifying the possible risks or operational difficulties, standard hazard analysis procedures are applied. Risks are defined as different issues interfering with a process or as potential hazards in a piece of equipment, which may put people or facilities in danger or cause injuries [17].

### *1.4 KPPS or Election Officers*

Political parties in Indonesia are likely to suggest candidate leaders or representatives for the 2024 general elections based on the characteristics of those elected in the 2019 general elections [18]. The members of the Indonesian House of Representatives (Dewan Perwakilan Rakyat) have called for an improved system in the 2024 elections to prevent the health issues and fatalities experienced by KPPS members during the 2019 election and the urgency to prevent the election officers with e-vote in the future [19]. The voting organizer group plays a crucial role in ensuring the smooth execution of the election process. Quoting KPU Regulation Number 8 of 2022, KPPS' main task is to organize voting. KPPS is assigned at polling stations and formed to organize voting and counting of votes in elections. KPPS members consist of seven people from members of the community around the polling stations, with one chairman and six members [20].

## **2. Methods**

The methodology in this study used a quantitative approach with data collection techniques through measuring blood pressure and oxygen saturation (oximeter) of seven Election Officers at TPS 07 Cerme Kidul, Gresik, East Java. The selection of participants was done purposively based on the criteria of task suitability, active working age range according to KPU regulations, and availability to undergo health monitoring during the election period. Although the sample size is relatively small, this is adjusted to the exploratory nature of the case study and the limited number of KPPS per polling station which only consists of seven people.

The following techniques were employed in this study: (1) direct observations of Election Officers' real-time circumstances at TPS 07 in the Cerme Region of Gresik Regency, East Java; (2) interviews with Election Officers while they were engaged in duties; (3) Primary data obtained straight from the oximeter and tensimeter readings; (4) a literature review to look for, gather, read, and analyze data from a variety of sources relevant to the research questions, which generates hypotheses on the issue under investigation.



**Figure 1.** Election Officers' briefing

In data processing, there are six stages, namely: (1) listing and categorizing the incidences of fatigue that befell Election Officers, (2) identifying and classifying the most problematic workplaces from the list of incidences. (3) identifying and classifying KPPS members' fatigue levels (4) determining the ergonomic risk factors (ERFs) on the most challenging workload, excessive working hours, and sleep deprivation; (5) analyzing and discussing the findings from the previous subsections to determine whether the research findings meet the objectives; (6) processing data to produce a bigger plan design and determine the related ergonomic risk factors (ERFs) at the work site, thus enhancing the present system and improving the work conditions of Election Officers; (6) concluding the study from the data processing, analysis, and discussion.

The TPS 07 in Cerme, Gresik Regency was selected as the research site for this study. The study was conducted from January 25, 2024, until February 15, 2024.



**Figure 2.** Election Officers' blood pressure checking



**Figure 3.** The process of poll counts at the polling station

### 2.1 Data analysis

Data analysis was conducted using the Wilcoxon Signed Rank Test to compare physiological conditions before and after election day. The Wilcoxon test was chosen because the data were non-parametrically distributed and the sample size was small, making this test more appropriate than parametric tests such as the paired t-test. However, a limitation of this approach is the absence of a control group, which hinders the ability to more accurately isolate the independent variable. In addition, potential confounding variables, such as pre-existing medical conditions, smoking habits, or personal stress levels were not fully controlled in this study, which may influence the physiological measurement outcomes. Therefore, this study recommends that future research consider using quasi-experimental designs or comparative controls to enhance the validity and generalizability of the findings.

### 3. Results and Discussion

Duties and authorities of the KPPS based on PKPU No. 8 of 2022 in realizing voter sovereignty have an important role in making an election a success. KPPS was formed by PPS on behalf of the Regency/City KPU to carry out voting and poll count for the elections for members of the house of representatives (DPR), Regional Representative Council of Indonesia (DPD), provincial house of representatives (DPRD) and regency/city DPRD. KPPS consists of seven people consisting of a chairman who is also a member and six members. The Fourth KPPS Member and the Seventh KPPS Member have the same task of maintaining order if there are no public protection (LINMAS) officers at the polling station.

One of the tasks of KPPS in carrying out voting and poll count at TPS is to realize voter sovereignty, serve voters in using their voting rights, and provide access and services to voters with disabilities in casting their votes. The implementation of the above tasks needs transparency, impartiality, a high level of accuracy and responsibility so that democratic values can be realized.

**Table 1.** The following are the duties of each KPPS 1-7, from their inauguration as KPPS Election Officers to voting activities

No	Name	Duties	Working Days
1.	TY 21 years old Male Honorarium for all processes: IDR 1,200,000, -	<input type="checkbox"/> Announce the day, date and time of voting as well as the number/location of the polling station no later than five days before the day and date of voting <input type="checkbox"/> Provide ballot papers to voters registered in the DPT, DPTb, or DPK <input type="checkbox"/> Explain the position and duties of each KPPS member according to the technical guidance provided by the PPS <input type="checkbox"/> Open the voting meeting at exactly 07.00 local time if voters and/or witnesses are present <input type="checkbox"/> Explain the voting procedures to voters <input type="checkbox"/> Sign the ballot papers for all votes <input type="checkbox"/> Provide four types of ballot papers to voters <input type="checkbox"/> If a ballot paper is damaged or cast incorrectly, the Chairman of KPPS shall give a replacement ballot paper to the voter at most 1 (one) time <input type="checkbox"/> Assist in inserting the DPD ballot paper into the voting aid for the blind, and hand it over to the blind voter to go to the voting booth or template, to avoid errors in entering the position of the ballot paper into the aid for the blind <input type="checkbox"/> Announce the vote counting results at the TPS and close the vote counting meeting <input type="checkbox"/> Submit the ballot box and equipment to PPS on the same day	<input type="checkbox"/> February 07, 2024 (16.30 - 21.00) <input type="checkbox"/> February 07, 2024 (16.30 - 21.00) <input type="checkbox"/> February 14, 2024 (06.30 - 07.00) <input type="checkbox"/> February 14, 2024 (07.00 - 07.15) <input type="checkbox"/> February 14, 2024 (07.15 - 07.25) <input type="checkbox"/> February 14, 2024 (07.25 - 08.10) <input type="checkbox"/> February 14, 2024 (08.10 - 13.00) <input type="checkbox"/> February 14, 2024 – February 14 (13.00 - 01.00) <input type="checkbox"/> February 15, 2024 (02.00 - 03.00)

No	Name	Duties	Working Days
2.	S 49 years old Male Honorarium for all processes IDR 1,100,000, -	<input type="checkbox"/> Fill in the name of the sub-district, the name of the village/kelurahan, and the TPS number on the ballot paper <input type="checkbox"/> Give a ballot paper filled in with the name of the sub- district, the name of the village/kelurahan, and TPS number to the Chairman of the KPPS for signature. <input type="checkbox"/> Record the number of ballot papers announced by the Chair of the KPPS in the Results Certificate and Details of the Counting of Votes at the Polling Place <input type="checkbox"/> Open the ballot papers one by one <input type="checkbox"/> Fill out the Form for Minutes of Voting and Vote Counting at the Polling Place	<input type="checkbox"/> February 14, 2024 (07.25 - 08.10) <input type="checkbox"/> February 14, 2024 07.25 - 08.10 <input type="checkbox"/> February 14, 2024 07.25 - 08.00 and the results process will continue on 15 <input type="checkbox"/> February 14, 2024 at 01.00 <input type="checkbox"/> February 14, 2024 13.00 - 01.00 <input type="checkbox"/> February 15, 2024 01.00 - 02.00
3.	SNR 24 years old Female Honorarium for all processes IDR 1.100.000, -	<input type="checkbox"/> Fill in the name of the sub-district, village/kelurahan name, and TPS number on the ballot paper <input type="checkbox"/> Give a ballot paper filled in with the name of the sub- district, name of the village/kelurahan, and TPS number to the Chairman of the KPPS for signature. <input type="checkbox"/> Record the number of ballot papers announced by the Chair of the KPPS in the Results Certificate and Details of the Counting of Votes at the Polling Place <input type="checkbox"/> Open the ballot papers one by one <input type="checkbox"/> Fill out the Form for Minutes of Voting and Vote Counting at the Polling Place	<input type="checkbox"/> February 14, 2024 07.25 - 08.10 <input type="checkbox"/> February 14, 2024 07.25 - 08.10 <input type="checkbox"/> February 14, 2024 07.25 - 08.00 and the results process will continue on 15 <input type="checkbox"/> February 2024 at 01.00 <input type="checkbox"/> February 14, 2024 13.00 - 01.00 <input type="checkbox"/> February 15, 2024 01.00 - 02.00
4.	WN Female 32 years old Honorarium for all processes IDR 1,100,000, -	<input type="checkbox"/> Fourth KPPS member sitting near the entrance: <input type="checkbox"/> Receive the voter and check the C6 Model brought by the voter and match it with the DPT, DPTb or DPK <input type="checkbox"/> Check the voters' fingers to ensure there is no ink indicating that they have voted <input type="checkbox"/> Create and fill in an attendance list containing columns for arrival number, voter serial number in the voter list (DPT/DPTb/DPK/DPKTb), and gender <input type="checkbox"/> Write the arrival order number on the Voting Notification Letter to Voters (model C6), provide information notes if the voter is a person with a disability and the type of voter's disability to facilitate service/provision of assistance <input type="checkbox"/> Ask voters to sit in the places provided while waiting for the call	<input type="checkbox"/> February 14, 2024 (08.10 - 13.00) <input type="checkbox"/> February 14, 2024 (00.00 – 01.30)

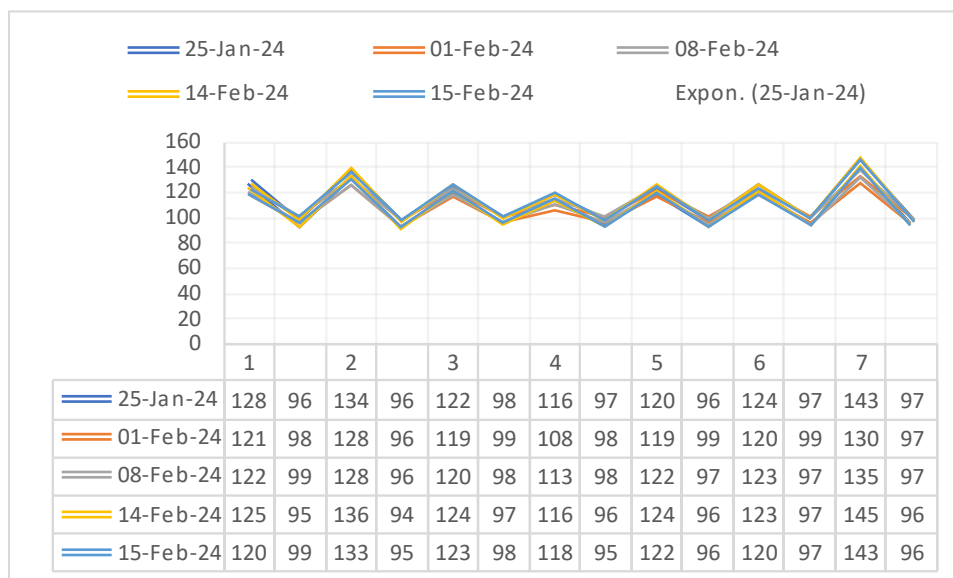
No	Name	Duties	Working Days
		<input type="checkbox"/> Provide Voting Notification Letters to Voters (C6 model) to the KPPS Chair periodically <input type="checkbox"/> Provide opportunities for voters who do not bring/did not receive a Voting Notification Letter from Voters (C6 model) but are registered in the voter list, as proven by KTP (Id card) or Family Card or other identity <input type="checkbox"/> Provide an opportunity for voters who are not registered in the DPT, DPTb and DPK who bring/show their Id Card or Family Card or other identification to vote at the TPS according to the address stated on the voter's Id Card or Passport one hour before the end of voting by considering availability ballots and notes in a special Model A.T <input type="checkbox"/> Remove the ballot papers from the ballot box <input type="checkbox"/> Record in the records the vote count results for each political party and candidate members of the DPR/DPD/Provincial DPRD/Regency/Municipal DPRD at the polling place which are posted on the notice board by tally (III) <input type="checkbox"/> Record in the records the vote count results for each political party and candidate for members of the DPR/DPD/Provincial DPRD/Regency/Municipal DPRD at the polling place in the column of the total number of valid votes for the political party which is the sum of the valid votes obtained by the political party and the valid votes all candidates from the political party concerned	
5.	MH 39 years old Male Honorarium for all process IDR 1.100.000, -	<input type="checkbox"/> Direct voters to enter an empty voting booth to cast their vote <input type="checkbox"/> Assist voters with disabilities and voters who need assistance to cast their vote, if requested by the voter concerned <input type="checkbox"/> Open all the ballot boxes one by one, take out the ballot papers and arrange/stack them neatly and count the number of ballot papers to ensure that no ballot papers are mixed up in the ballot boxes <input type="checkbox"/> Record in the records the vote count results for each political party and candidate members of the DPR/DPD/Provincial DPRD/Regency/Municipal DPRD at the polling place which are posted on the notice board by tally (III)	<input type="checkbox"/> February 14, 2024 08.10 - 13.00 <input type="checkbox"/> February 14, 2024 08.10 - 13.00 <input type="checkbox"/> February 14, 2024 08.10 - 13.00 <input type="checkbox"/> February 14, 2024 08.10 - 13.00 <input type="checkbox"/> February 14, 2024 08.10 - 13.00 <input type="checkbox"/> February 14, 2024 08.10 - 13.00 <input type="checkbox"/> February 14, 2024 08.10 - 13.00 <input type="checkbox"/> February 14, 2024 08.10 - 13.00 <input type="checkbox"/> February 14, 2024 13.00 - 13.30

No	Name	Duties	Working Days
		<input type="checkbox"/> Record in the records the vote count results for each political party and candidate for members of the DPR/DPD/Provincial DPRD/Regency/Municipal DPRD at the polling place in the column of the total number of valid votes for the political party which is the sum of the valid votes obtained by the political party and the valid votes all candidates from the political party concerned	according to the order of the voting cards <input type="checkbox"/> February 14, 2024 – <input type="checkbox"/> February 15, 2024 13.30 - 01.30 <input type="checkbox"/> February 14, 2024 <input type="checkbox"/> February 15, 2024 13.30 - 01.30
6.	MJ 24 years old Male Honorarium for all process IDR 1.100.000, -	<input type="checkbox"/> Help direct voters to put ballot papers into the ballot box according to the type of ballot paper starting Direct voters to enter an empty voting booth to cast their vote from DPR, DPD, Provincial DPRD and Regency/City DPRD ballot papers <input type="checkbox"/> Ensure that all ballot papers used by each voter have been placed in the ballot box <input type="checkbox"/> Invite voters to the Seventh KPPS Member's seat near the TPS exit <input type="checkbox"/> Arrange and group the ballot papers	<input type="checkbox"/> February 14, 2024 08.10 - 13.00 <input type="checkbox"/> February 14, 2024 08.10 - 13.00 <input type="checkbox"/> February 14, 2024 08.10 - 13.00 <input type="checkbox"/> February 14, 2024 08.10 - 13.00
7.	AW 28 years old Male Honorarium for all process IDR 1.100.000, -	<input type="checkbox"/> Invite the voter to dip one of his fingers into the ink bottle and ensure that the ink has wet the fingernail <input type="checkbox"/> Ensure that voters' fingers that are dipped in ink are not wiped and cleaned by voters, and for voters with disabilities who do not have both hands, ink marking can be done on one of their toes	<input type="checkbox"/> February 4, 2024 08.10 - 13.00 <input type="checkbox"/> February 14, 2024 08.10 - 13.00 <input type="checkbox"/> February 14, 2024 08.10 - 13.00 and then continue helping to count the ballot boxes that have been voted on. February 14, 2024 – February 15, 2024 <input type="checkbox"/> 13.00 - 02.00



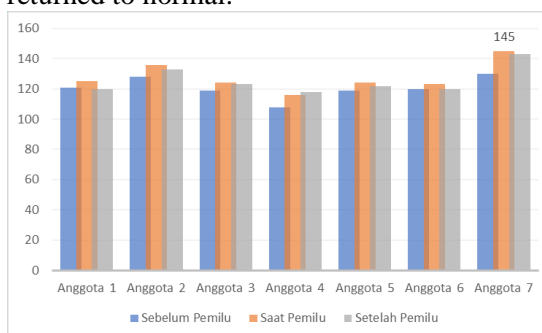
### KPPS Election Officers' Tensimeter and Oximeter Results

Election Officers' blood pressure and oximeter results from the time they were appointed until voting day were checked once every week. Blood pressure and oximeter results for the seven Election Officers were taken on January 25 2024, February 1 2024, February 8 2024, February 14 2024 and February 15 2024.



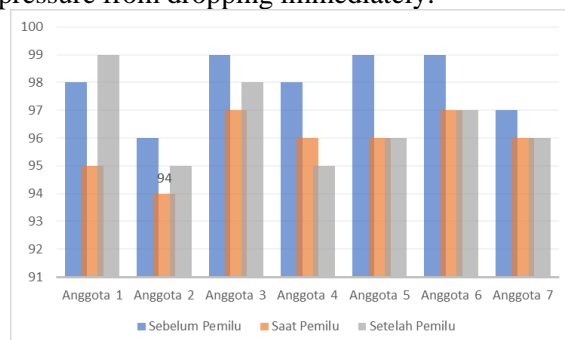
**Figure 4.** Election Officers' Tensimeter and Oximeter Results

Based on the data above, Officer 1's blood pressure is considered normal for adults because there was no high increase in blood pressure. Officer 2's blood pressure was above an average of 130 on the 25<sup>th</sup> of Jan, 14<sup>th</sup> of Feb and 15<sup>th</sup> of Feb. On the 25<sup>th</sup>, he had just returned from work. Meanwhile, on the 14<sup>th</sup>, it was due to fatigue after being on duty on voting day. This condition was monitored by health workers and he was given medication to lower blood pressure. He was also provided with healthy food while on duty. On the 15<sup>th</sup>, after resting, the blood pressure returned to normal. Officer 3 had normal blood pressure for adults because there was no high increase in blood pressure. Officer 4's blood pressure was considered normal for adults. Officer 7's blood pressure was above 130 on the 25<sup>th</sup> of Jan, 14<sup>th</sup> of Feb and 15<sup>th</sup> of Feb. On the 25<sup>th</sup>, it was discovered that he stayed up late because he was working overtime and also carried out heavy activities on that day. Meanwhile, on the 14<sup>th</sup>, it was due to fatigue after being on duty on voting day. This condition was monitored by health workers and he was given medication to lower blood pressure. He was also provided with healthy food while on duty. On the 15<sup>th</sup>, after resting, the blood pressure returned to normal.



**Figure 5.** Blood Pressure Result

Based on the picture above, it can be observed that blood pressure during the election (in red) tends to increase for each member, especially for member 7, whose blood pressure reached 145 mm Hg during the election. The tendency for increased blood pressure in each KPPS member during the election is due to the high workload and insufficient rest. Then, a day after the election (in gray), the blood pressure slightly decreased but remained relatively high. This indicates that even after the election, the workload persists, preventing blood pressure from dropping immediately.



**Figure 6.** Oximeter Results

Based on the picture above, it can be seen that the oximeter levels during the election (in red) tend to drop drastically for each member, especially for members 1, 5, and 6. Although still within the normal range (94-100), the decrease in oxygen saturation levels may indicate fatigue, and if not addressed promptly, it could lead to more serious health issues.

**Table 2.** Results of Wilcoxon Test From Blood Pressure and Oximeter

Variable	Group	Mean	SD	p
Blood Pressure	Before election day	120.71	7.16	0.046
	After election day	125.57	9.11	
Oximeter	Before election day	98.00	1.16	0.047
	After election day	96.57	1.51	

Based on the results of the Wilcoxon signed rank test above, in the case of blood pressure, it is known that the p-value or significance value is 0.046. Since the p-value (0.046) is  $< 0.05$ , it can be concluded that there is a significant difference in blood pressure levels among KPPS members before and after the election. It can be seen that the average blood pressure of KPPS members after the election is 125.57, an increase from the average before the election, which was 120.71. This indicates that the election process involves a relatively high workload, as evidenced by the significant increase in the average blood pressure of KPPS members. In the case of the oximeter, it is known that the p-value or significance value is 0.047. Since the p-value (0.047) is  $< 0.05$ , it can be concluded that there is a significant difference in oximeter levels among KPPS members before and after the election. It can be seen that the average oximeter level of KPPS members after the election is 96.57, a decrease from the average before the election, which was 98. This indicates that the election process involves a relatively high workload, as evidenced by the significant decrease in the average oximeter levels of KPPS members.

**Table 3.** Results of Kendall's Test

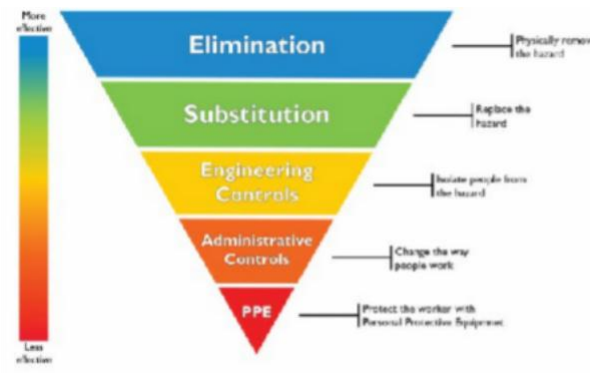
Correlation	Kendall's tau value
Age and blood pressure	0.250
Age and Oximeter	-0.821**

Based on the results of the Kendall's tau test above, it can be seen that there is no significant relationship between age and blood pressure ( $\tau = 0.250$ ,  $p > 0.05$ ). However, for the oximeter variable, it was found that there is a significant relationship between age and oximeter levels ( $\tau = -0.821$ ,  $p < 0.05$ ), with a negative direction. This indicates that as the age of KPPS members increases, their oximeter levels tend to decrease.



**Figure 7.** Diagram of the 2019 and 2024 Pulse Diagrams  
Source: Data Processed 2024

According to the aforementioned statistics, 5,175 Election Officers were ill after carrying out their duties, and that number dropped by 2,297 to 2,878 in 2024. The death rates drastically fell in 2024 to 114, compared to 894 in 2019. Based on the table summarizing the duties and working hours of Election Officers, the risk of fatigue in each activity was obtained. From this, risk management needs to be developed by using risk control strategies to minimize the risk of fatigue. This aims to help the selection of a control hierarchy, illustrated as follows:



**Figure 8.** Risk management referring to the OHS control hierarchy

Based on the aforementioned statistics, excessive working hours to carry out the duties, particularly on the voting day, February 14, 2024, from 07.00 to 02.00 in the morning, were the cause of exhaustion experienced by KPPS personnel. Therefore, OSH risk management is required to prevent KPPS officials from being overly fatigued by eliminating their excessive working hours [21].

Based on the data from the research results above, it can be seen that the duties of each KPPS officer, from Officer 1 to 7, were in accordance with PKPU regulations No. 8 of 2022. The term of office of Election Officers begins on January 25, 2024. Based on the SEM-PLS results, there is a relationship between average fatigue and the results of the tensimeter and oximeter of the Election Officers. There was an increase in blood pressure in Officer 2 and Officer 7 due to fatigue from work. Staying up late doing work tasks was the trigger for the increase in blood pressure. Meanwhile, on February 14, 2024, the high blood pressure was due to fatigue from the excessive working hours. However, health workers monitored the condition of these Election Officers. Treatment was carried out by administering blood-lowering drugs and regular checks. On February 15, 2024, the blood pressure began to fall.

**Table 4. Risk Management Fatigue of the Election Officers**

<b>Elimination</b>	<b>Substitution</b>	<b>Technology Engineering</b>	<b>Administration</b>	<b>Personal Protective Equipment (PPE)</b>
Excessive working hours before during and after the voting day	1. Change of maximum age limit 2. Change of health certificate information to be more complete 3. Replace officers with comorbid risks with officers without comorbid risks	1. Making an SOP for working hours for Election Officers 2. Regular health monitoring when Election Officers are on duty 3. Update the system for sending ballot results digitally 4. E-Voting	1. There is a clear simulation of the voting flow 2. Technological education for all Election Officers 3. Health check while on duty	1. Ergonomic Footwear 2. Ergonomic Seating 3. Protective Gloves 4. Cooling Vests 5. Head Protection 6. Back Support Belts 7. Health Monitoring Devices

Source: Processed Data, 2024

### Discussion

Based on the research data, the duties of each Election Officers, starting from Officer 1 to 7, align with PKPU No. 8 of 2022. The Election Officers term of office began on January 25, 2024. Based on the SEM-PLS results, there is a relationship between the average fatigue and the tensimeter and oximeter's test results of the Election Officers.

The duties of Election Officers include announcing the list of permanent voters at the polling station and submitting the list of permanent voters to the witnesses of the election and the supervisor of the polling station. In the event that the election participants do not have witnesses, the list of permanent voters is submitted to the election participants. They also carry out the voting and vote counts, prepare minutes and certificates detailing the voting and counting results, and present them to polling station managers, PPS, PPK, and witnesses of the election. In addition, they carry out other tasks assigned by statutory regulations to the KPU, Provincial KPU, Regency/City KPU, PPK, and PPS, deliver notification letters to voters to cast their votes at polling stations, perform additional tasks in compliance with the terms of applicable laws and regulations, give voters their sealed ballots, and ensure they know their rights while casting a ballot.

The following is the flow of voting for the 2024 General Election at Cerme 07 polling station. In preparation for voting, the Chairman and KPPS members must have arrived at the polling station by 06.00 local time. They check polling stations and the means of implementing voting and counting votes. The KPPS Chairman opens the ballot box and checks the voting and counting equipment. If the voters and/or witnesses are present, the Chairman of the KPPS opens the voting meeting at 07.00 local time. The Chairman of the KPPS explains the purpose and procedures of voting to voters and witnesses. The KPPS members call voters based on the arrival sequence number written on Model C6. The voter receives the ballot paper, casts a vote in the voting booth, puts the ballot paper into the ballot box, and marks their finger as a sign that they have voted. At 12:00 local time, the Chairman of the KPPS announces that voters listed in the Additional Special Voters List (KPU Special Model A.T) can start casting their votes as long as ballots are still available. At 13.00 local time, the Chairman of the KPPS announces that the voting has been completed and only allows voters who have arrived at the polling station and are waiting for their turn to vote.

After the voting is completed, the vote-counting stage begins. The process and preparation are as follows: The KPPS Chairman, assisted by the KPPS members, organizes the venue and equipment for the vote-counting meeting. The C1 Plano Model Form is displayed on the announcement board, and the necessary administrative materials for the vote count are arranged. The ballot box is placed near the KPPS Chairman's desk, and the key is prepared. The Chairman then invites the members, witnesses, and election observers to take their designated seats and ensures that the witnesses have submitted a mandate letter.

The first Election Officer fills in the number of voters on the C1 Model form. Vote counting commences by removing ballots from the ballot box, and the Election Officer announces the total

number of ballots. The second and third Election Officers open the ballots one by one, clearly announcing whether each ballot is valid or invalid (with explanations) and displaying them for the witnesses, PPL, and public to see. The fourth and fifth KPPS Election Officer record the results on the C1 Plano Model Form, which is affixed to the announcement board. The sixth and seventh KPPS members arrange and group the ballots that are declared valid and the ballots that are declared invalid. They fill in the results of the vote acquisition on the Plano Model C1 form, fill in the Model C Form, Model C1, and Model C1 Attachment. They put the ballots into the cover. The Chairman of the Election Officer announces the complete results of the vote count at the polling station and closes the vote counting meeting. A break is taken after each ballot box is counted to reduce the fatigue of Election Officers.

The study results found that Election Officers 2 and 7 experienced an increase in blood pressure on the day of voting due to excessive fatigue. Aside from resting after the count of one vote box, health vitamins were distributed and frequent inspections were done by health workers at each polling station.

Based on the pulse diagram from 2019 and 2024, it is known that there are differences in the number of deaths and the number of Election Officers who fell ill. The following are the differences in the 2019 and 2024 KPPS officer rules, which may have resulted in the differences:

a. Maximum age limit for Election Officers

In the 2019 election, the KPU only regulated the minimum age limit for KPPS members, which was at least 17 years old. However, in the 2024 Election, the KPU not only regulates the minimum age but also the maximum age. Article 35 paragraph (1) letter b and paragraph 2 PKPU No. 8 of 2022 clearly states that "the age requirements for KPPS consider the age range from 17 years to 55 years, as of the voting day of the General Election or Election".

b. All Election Officers were provided with technical guidance

Technical guidance for KPPS members is one of the KPU's efforts to facilitate voting at all polling stations. The guidance is given so that all KPPS members understand their duties during voting and counting.

c. Increased Fees

The amount of KPPS honorarium for the 2024 Election has increased by more than 100 percent compared to the 2019 Election. In the 2019 elections, the KPPS chairman received an honorarium of IDR 550 thousand; in the 2024 elections, receive IDR 1.2 million. Then, the 2024 Election KPPS members receive Rp1.1 million; previously, in the 2019 Election, they received an honorarium of IDR 500 thousand.

d. Creating Effective and Efficient Voting

Voting and counting is the peak process of the election. KPPS must process many types of ballots and minutes. In the 2024 election, technology helps the election process.

Involving Medical Personnel and Health Service. The KPU is working with the local health office to anticipate fatigue and death, such as in the 2019 elections. They will be placed in several strategic polling stations to stand guard if KPPS members need help.

e. Health History Screening

All Election Officers participate in the health screening procedure to reduce hazards and identify anyone with moderate to severe medical issues.

This finding strengthens the hypothesis that the temporary but intensive work of KPPS has a significant impact on physical health, especially in the form of increased blood pressure and decreased oxygenation. This result is in line with Hidayat's research (2022) which confirms that work fatigue without adequate rest pauses can trigger temporary hypertension. However, unlike previous observational studies, this study used direct biometric data to prove the physiological impact of electoral activities on individuals. Although the blood pressure and oximeter figures are still in the subclinical category, if such working conditions are repeated over a period of time (e.g. every five years), they may contribute to the accumulation of chronic stress and potential cardiovascular disease in the future.

A comparison of data between 2019 and 2024 does show a decrease in the number of deaths and illnesses of Election Officers. However, this decline is not enough to declare that the system is completely safe. Policies such as age restrictions and initial health screening are positive steps, but they do not address structural factors such as excessive working hours and the lack of a rotation or shift

system. In this context, the research provides recommendations that future election management systems should not only be oriented towards administrative smoothness, but also pay attention to the sustainability of the overall health protection of officers.

Long-term implications that must be taken into account include the possibility of increased risk of health problems due to recurrent fatigue syndrome, especially for officers nearing the upper age limit (50-55 years). In addition, the lack of ergonomics education and mitigation strategies in the field is also a challenge. Therefore, the development of an integrated training system and the integration of technology-based real-time health monitoring should be considered in Indonesia's election management reform.

Based on the results of the risk management table and hierarchical triangle, it can be seen that fatigue that occurs in Election Officers is due to excessive working hours while on duty, especially on voting day, namely on February 14, 2024, at 07.00 until February 15, 2024, at 02.00 in the morning. So, it is necessary to implement OSH risk management to overcome fatigue, e.g., by reducing the excessive working hours.

**Ergonomic Hazard Risk Factors:** There are several ergonomic risk factors in Election Officers. They have poor work organization because the work time is tight. The breaks for rest should be improved. A study on working hours shows that exceeding eight hours can cause lower back pain. Feeling bored may cause stress, which then triggers lower back pain.

**Continual Repetition:** Election Officers perform continuous repetitive activities when carrying out their duties, such as giving ballots, signing ballots, and so on. It will make the muscles continuously receive pressure due to the workload. The risk depends on the number of times the activity is carried out, the speed of movement, and the number of muscles involved in the work. This repetitive movement will cause strain on the nerves and muscles.

**Stationary Positions:** Election Officers sit a lot. Long periods of stationary work require the muscles to supply their oxygen and nutrients, and the waste products are not removed. Local buildup of hypoxia and lactic acid increases muscle tangles, with the impact of pain and fatigue.

#### **4. Conclusion**

This study highlights the significant impact of high workload, long working hours, and insufficient rest on the health of Election Officers, as evidenced by increases in blood pressure and decreases in oxygen saturation levels following the election. While the KPU has made strides in administrative improvements between the 2019 and 2024 elections, such as age restrictions and higher honorariums, Occupational Health and Safety (OHS) considerations remain insufficiently incorporated into the election management framework. To address these concerns and enhance the well-being of election organizers, we propose several actionable recommendations for future elections: (1) the adoption of work shift systems or task rotations to limit continuous work hours to no more than 12 hours; (2) the introduction of mandatory, structured rest periods between voting and vote-counting activities; (3) the establishment of more comprehensive health screening protocols, including the evaluation of chronic conditions and individual risk factors before the appointment of KPPS election officers; (4) the use of ergonomic aids, such as comfortable seating, proper lighting, and work positioning devices, to alleviate physical strain; and (5) the deployment of health professionals at key polling stations for real-time monitoring of KPPS election officers' health during election day. Incorporating ergonomics and OHS principles into the planning and execution of elections is an urgent priority for the KPU and other relevant stakeholders. This approach will ensure that future elections are not only democratic and efficient but also safeguard the health and welfare of all those involved in the process.

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