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Assessment of effectiveness of health and safety measures on employees' performance in Tanzania government chemistry laboratory authority

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ABSTRACT

The purpose of this paper was to examine effectiveness of health and safety measures on employees' performance in Tanzania government chemistry laboratory authority. The performance and productivity of employees are closely linked to the health and safety of their working environment, which can serve as a key motivator and influence job satisfaction. Historically, concerns over workplace safety gained prominence during the industrial evolution, marking a shift in work conditions and the recognition of workers' rights to safe environments. The importance of the occupational health and safety at working place led to this study which assessed compliance health and safety measures in Tanzania Government Chemistry Laboratory Authority (GCLA) and its impact on the employees' performance. Using mixed method approach i.e. quantitative (questionnaires) and qualitative (interviews) data collection methods and analysis, the study found that GCLA has effectively implemented core health and safety protocols, including emergency preparedness, proper handling of hazardous materials, and regular training. These measures were shown to have a positive influence on employee performance. The study concludes with several recommendations, including regular updates to safety policies, the integration of mental health support programs, and the strengthening of monitoring and evaluation systems.

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INTRODUCTION

The health and safety policies of the organization have been extremely important for centuries, as employers have a duty to safeguard the welfare of their employees. Numerous significant studies have been carried out to comprehend the necessity of executing and upholding health and safety protocols in the workplace (Schulte et al., 2022). It has been discovered that this idea originates from the 18th century during the industrial revolution, a period characterized by high levels of injury and sickness among labourers due to hazardous working conditions. As factories proliferated and mass production expanded, there arose an urgent necessity to tackle the health and safety dangers linked to these novel working settings, which resulted in the creation of initial regulations and laws designed to shield workers from injury (Reese, 2015).

The trends show that working environments nature and its force have been changing gradual and it is expected to change more in the future broadly and affect the working environments of the world resulted from creations of new hazards that needs controls (Schulte et al., 2022). Those changes and developments create signs to the health and safety responsible organs in an organization to continue setting policies, procedures, and practices to prevent accidents, injuries, and illnesses in the workplace (Lehto & Cook, 2012). This procedure includes various tasks and factors, such as research focused on establishing a secure and healthy workplace for employees, contractors, visitors, and all others the organization's operations might influence (Mujtaba & Kaifi, 2023).

The broad spectrum of workplace dangers referred to as hazardous working conditions in Tanzania presents difficulties to the well-being and safety of individuals at work, despite the fact that employment provides various financial and other benefits. Work-related hearing impairment is the most commonly acknowledged occupational injury in Tanzania, with 22 million workers exposed to unsafe noise levels in their jobs and an annual expenditure of

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approximately $242 million on compensation for hearing loss deficiencies (Nkuba & Mtebe, 2023).

Based on a handout from OSH dating back to 2014-2015, some typical health dangers in the workplace are chemical and biological ones, along with things like noise, extreme temperatures, radiation, vibration, ergonomic issues or strain injuries from overexertion, and psychological factors. It has been suggested that when workers are healthy and safe, they tend to be more productive, that means that employee well-being plays significant role in the performance (Khalid, 2023). Furthermore, studies have shown that strong safety support and adherence to health and safety rules can improve employee objectivity (Calista *et al.*, 2022). Despite the studies showing a connection between worker performance, health and safety practices, there's still a need for more real-world evidence to keep information current. This need arises because employee well-being significantly influences performance in businesses focused on results (Henningsen, 2024).

A number of studies have examined the impact of working conditions on health and safety, including (Okechukwu *et al*, 2021), (Jain *et al*, 2021); (Nkuba & Mtebe, 2023). The results indicate that safety programs can be effective in preventing accidents and reducing loss and damage to people and property by creating a strong connection between these two aspects and the performance of an organization through regulations and procedures. Several laws, regulations, procedures and recommendations about occupational health and safety devised ensure people do not get hurt. However, many organizations still encounter difficulties in upholding adequate health and safety standards that affect both employees and the organization (Hou *et al.*, 2021). Therefore, this study aimed to assess the compliance of health and safety measures in the Government chemist laboratory authority (GCLA) and its impact on employee performance. This study was focused on the comprehensive examination of health and safety protocols, as well as their effect upon employee effectiveness within an organization. By exploring the intersection between safety and health with employee performance, the study endeavors to shed light on the steadiness between workplace and individual output.

Literature review

Health and safety measures in an organization refer to the strategies, policies, procedures, and actions implemented to ensure the well-being and protection of employees in the workplace. These actions are intended to avert accidents, injuries, illnesses, and other possible dangers that may develop during work activities (Suh, 2021). The actions encompass risk evaluation that recognizes hazards and analyzes risks associated with them but also enforces controls, the formulation of various health and safety training programs, the provision of personal protective equipment, the establishment of emergency preparedness programs, the examination of adherence to laws and regulations and similar measures for a safe and healthy workplace within the organization are consistent with the same actions (OSHA, 2016).

According to the study of Mäkikangas *et al.* (2016) they have explained on how employee wellbeing is relates with working environment but also the individual performance, furthermore shown that the working environments is guided by standard and guidelines that need periodic evaluation. Moreover, the study by Roy's (2024) describes employee well-being as encompassing the complete mental, physical, emotional, and financial health of staff members. It is affected by multiple factors including their interactions with colleagues, the choices they make, and the tools and resources they can utilize; furthermore, working hours, compensation, and workplace safety greatly influence employee well-being.

Several theoretical foundations indicates that there is a relationship between working environment and employee performance, this study adopted the Herzberg's theory of two-factor theory which are motivators and hygiene as essential elements that inspire humans. Thus, motivators' factors encourage job satisfaction and hygiene factors prevent job dissatisfaction (Reyes, 2024). This concept, commonly referred to as the motivation-hygiene theory, is a well-known psychological model for comprehending employee motivation and contentment in the work environment (Raj, 2024). The first factor includes motivators that enhance job satisfaction and inspire employees to perform at their best, which includes achievement, recognition, responsibility, and opportunities for growth. The next factor is hygiene, which prevents job dissatisfaction but does not intrinsically motivate employees when present; this covers company policies, supervision, salary, interpersonal relationships, and working environments (Malik et al., 2023).

According to the study of (Alrawahi *et al.*, 2020), two factor theory recognizes working conditions, by defining health and safety as hygiene factors as it refers to, the existence of strong health and safety protocols which might not directly inspire employees, but their lack can result in disappointment, lower morale, and subsequently diminishes performance.

Moreover, additional studies indicate that although health and safety protocols might not immediately motivate employees, they are essential in avoiding dissatisfaction that can cause inadequate performance (Bhatt *et al*., 2022; Thant & Chang, 2021). The study of Dikbaş *et al*., (2023), that used this theory on finding the role of safety in banking working place during Covid19, the research utilized safety as a hygiene factor their results emphasized that although safety is not a main motivator, it is essential for avoiding adverse outcomes such as accidents, absenteeism, and turnover. The research indicated that by upholding high standards of health and safety, organizations can prevent these undesirable effects and guarantee steady employee performance. Consequently, this study applied this theory in directing the findings from research questions established in earlier sections.

Di Prinzio *et al.* (2021) research points out that since we spend nearly half our lives working, the workplace is an ideal setting for promoting health. In this light, Occupational Health Surveillance (OHS) is essential. It's a system where occupational organs regularly assess workers' health to spot any negative effects early on and prevent job related illnesses from developing in the first place. This system is required by laws and regulations designed to protect lives. OSHA and various health and safety framework organizations must enhance the emphasis on employee well-being by addressing the necessity of how modifications and the progression of the working environment, this drives alterations in training methods, research, and policy development. Moreover, OSHA should consistently aim to spearhead initiatives to avert workplace dangers and ensure worker safety to promote overall worker well-being (Schulte et al., 2022).

The study of Nkuba & Mtebe, (2023), explored how health and safety practices affect worker performance at the TBL factory in Mwanza. They looked at three main factors: health and safety training, working conditions, safety procedures, and risk management, examining how each of these contributed to employee performance. However, their research was somewhat narrow, focusing only on general health and safety measures within the organization and solely on the Mwanza factory. They suggest that further research is needed in this area to expand the existing knowledge base.

Researchers like Hoque *et al,* (2022), the study explored the effectiveness of workplace health and safety programs at a Canadian university. Their research examined how the university delivered occupational health and safety services and training to its employees, and analyzed the impact of these programs on the university community's knowledge, attitudes, and behaviors. It also assessed how well information about these programs was disseminated to workers across the university. The study revealed that current health and safety measures might be insufficient and suggested that regular presentations on available health and safety programs are necessary. To improve the situation, the university could increase the number of safety training programs and monitor employees who haven't received any training, especially those working in hazardous environments.

The study of Garba & Audu (2024) highlights how effective management and oversight can minimize health and safety hazards within construction firms. Their findings revealed that many injuries in these companies occur during mechanical operations, concrete work, blasting, and excavation. The study also emphasizes the crucial role leadership plays in enforcing health and safety policies, thus underscoring management's responsibility in mitigating workplace risks. Consequently, further research and data in this field could enhance managerial decisions related to creating safer working environments, ultimately impacting performance. A look through the research on health and safety practices and how they affect worker performance really highlights how important a secure and healthy workplace is to boosting a company's output and success (Vitrano & Micheli, 2024). The studies all agree that strong health and safety steps don't just cut down on workplace accidents and sickness, they also lift employee spirits, make them happier in their jobs, and improve their work overall.

Several studies have addressed different challenges concerning its critical and intersection of technology as well the need of inventing more efforts (Vitrano & Micheli, 2024). As this area gradually evolves, it continually presents challenges that grow more complex for organizations, particularly when it comes to performance. The study of Liaquat et al. (2024), have tackled the challenges posed by variations in industries and highlighted on necessitate of different measures according to the nature of working environment. As a result, more specific thorough studies are needed to promote industrial working place and address the challenge. Thus, carrying out a thorough empirical investigation into the effectiveness of health and safety measures and their influence on employee performance within Tanzanian organizations is believed to contribute to our understanding of this gap. This research was evaluated the health and safety measures put in place at the Government Chemist Laboratory Authority and their impact on employee performance

METHODOLOGY

This study was conducted in Tanzania mainly at Dar es Salaam region at Government chemist laboratory authority (GCLA). The study was selected because of being a laboratory which has high health risk associated with daily activities, the study was employed a mixed-methods approach. In-depth interviews and questionnaires were used to collect data. In addition, these two methods were complemented by a thorough documentary review.

The researcher decided to employ a variety of methods because a multiple approach (triangulation) allows the methods to be corroborated by comparing data produced by different methods, thereby strengthening the validity of the data collected. The use of multiple methods was done intentionally because no single method is adequate in itself for collecting valid and reliable data on a particular problem.

This approach blends together quantitative and qualitative research methods essentially in comprehensive mixed-methods research involves collecting and examining both types of data: quantitative and qualitative.

The study collected data from respondents with total number of 100 employees from biology and DNA, Toxicology, Forensic Chemistry, Food laboratory, Environmental Laboratory, legal section and Administration and Human Resource section and the stakeholders. These 100 respondents were selected because the researcher believed that they were well informed and had rich information on research objectives under questions. Furthermore, data collected was analyzed using SPSS as well for qualitative analysis involved both descriptive and inferential methods.

This study was conducted in Tanzania mainly at Dar es Salaam region at Government chemist laboratory authority (GCLA).

Essentially, comprehensive mixed-methods research involves collecting and examining both types of data: quantitative and qualitative. Quantitative data refers to information with pre-defined response options, On the other hand, qualitative data represents information that has been analyzed and interpreted and provide meaningful insights.

This study collected data from a sample size of 100 employees from biology and DNA, Toxicology, Forensic Chemistry, Food laboratory, Environmental Laboratory, legal section and Administration and Human Resource section. The researcher was intended obtain data from selected employees available in section.

This study used stratified sampling because it's a reliable way to pick participants. This method ensured we get a representative and diverse sample from the population we're studying. The study examined how well health and safety measures work to boost performance at the Government Chemist Laboratory Authority, this technique is especially useful. It brings accuracy, reliability, and works well across different surveys, all while saving time.

By using this technique, it is ensured that each stratum has a proportional impact on the final sample. The population size of the study is presented in Table 1 below.

Table 1. Population Size of the Study

S.N.	Section	Population
1	DNA/Biology	19
2	Chemistry	16
3	Toxicology	14
4	Environmental	16
5	Food	16
6	Administration & HR	11
7	Quality	5
8	Legal	3
	Total	100

Source: Field data, 2025

The researcher collected data from 100 respondents. As Kothari (2004) suggests, you want a sample size that's just right - not too large and not too small. He recommends that a good sample should be at least 10% of the total population. In this case, the target population has 100 respondents, and that number was based for figuring out the sample size.

Questionnaires were used to collected used to collect quantitative information was gathered from respondents. Google web forms of questionnaires were distributed. Online questionnaires were effective in reducing the time required to survey the target audience. Closed-ended questions require respondents to choose a single answer from outlined options, which restricts their open response. This was streamlining the process of gathering data and creating graphs and tables for analysis. Using the Likert scale, the questionnaire questions were used to collect data from stakeholders in the Government Chemist Laboratory Authority.

The researcher distributed online questionnaires to 100 respondents. Respondents were given a time of two weeks to respond. This time enable respondents to answer questions at their own convenience.

Significant qualitative data obtained through individual or group interviews with appropriately chosen participants. The interviews included questions that were set to interview respondents. Data that was collected during interviews help to explain the relationship between the working environment and employee performance through thematic analysis. Quantitative data was used to interpret the opinions gathered.

Data processing and analysis

Once participants have finished the online surveys and their responses have been gathered, SPSS was used to analyze the collected information. The research's qualitative analysis involved both descriptive and inferential methods. The software simplified the process of data collection for subsequent analysis. After the data is collected, it is fed into the analytical platform, which then detects numerical patterns. Researchers were subsequently pinpoint the key relationships within the dataset. Carter *et al.* (2023) suggest this approach to data analysis as a way to assist scholars in transforming vast quantities of quantitative data into meaningful findings.

Qualitative analysis was conducted using thematic analysis in the research. The interview data was transcribed first. Manual techniques were utilized to identify and develop recurring themes as part of the thematic analysis. Thematic analysis uncovered novel themes and patterns that were not anticipated during the initial investigation.

RESULTS

Introduction

The general objective of this study was to assess of health and safety measures in the employee performance in Tanzania organization, Government chemistry laboratory authority as a case study.

Demographic of respondents

This paper examines demographic characteristics and how they impacted health and safety measures.

One of the variables evaluated in the research is the demographic profile of the respondents is the age of the respondents. Table 2 presents the demographic profile data collected from a research study conducted in 2025. The age distribution of the respondents shows a varied representation across different age groups. The largest proportion of respondents falls within the 35-44 years category, accounting for 34% of the total sample. Following closely, the 15-24 years age group comprises 27% of the respondents, while the 25-34 years group represents 26%. The distribution gradually decreases in older age brackets, with 12% of respondents aged 45-54 years and only 1% aged 55-64 years. Interestingly, there are no respondents over 65 years old, which might indicate the study's target population or sampling limitations.

Gender distribution shows a slight majority of male respondents, constituting 54% of the total sample, while females account for 46%. The relatively balanced gender distribution suggests a diverse representation within the sample.

Table 2. Demographic profile.

Demographic characteristics		Frequency	Percentage
Age	Less than 15 Years	0	0
	15-24 ears	27	27
	25-34 Years	26	26
	35-44 Years	34	34
	45-54 Years	12	12
	55- 64 years	1	1
	Over 65 years		
	Total	100	100
Gender	Male	54	54
	Female	46	46
	Total	100	100
Education Background	Below high and High school	0	0
	Ordinary diploma	22	22
	Bachelor's degree	67	67
	Master's degree	9	9
	PhD	2	2
	Total	100	100
Experience	Less than 1 year	3	3
	1-3 years	10	10
	4-6 years	64	64
	More than 7 years	23	23
	Total	100	100

Source: Field data (2025)

Respondents' educational backgrounds exhibit a varied distribution across different levels of education. The majority of respondents hold a Bachelor's degree, with 67% reporting having completed this level of education. Following Bachelor's degrees, 22% of respondents have an ordinary diploma, while smaller proportions hold

higher degrees such as Master's (9%) or PhD (2%). Notably, there are no respondents with educational qualifications below high school or limited to high school education.

The experience in the working environment the responds show that the majority have experience from 4-6 years with 64% followed with more than 6 years of experience where 23% responded. The responded with experience 1-3 with 10% and the smaller group of respondents was with the experience of less than 1 year where only 3% responded.

All respondents surveyed (100%) are away with health and safety at working place but also associated with GLCA working environments, indicating universal adoption on the important of health and safety measures within the studied population. This high prevalence of health and safety measures its significance as a communication and engagement channel among the target demographic.

The demographic profile data outlined in the table 2 provides valuable insights into the characteristics of the study's respondents. Understanding the age distribution, gender representation, educational backgrounds, and experience among respondents is essential for interpreting research findings and tailoring strategies to effectively engage with the target audience. The diverse demographic profile suggests a broad representation within the sample, enhancing the generalizability of the research outcomes within the specified population.

Table 3. Reliability

Reliability statistics	Cronbach alpha	Internal consistency
Health and safety measures	0.726	Good
Impacts on employee's performance	0.712	Good
Solutions	0.705	Good

Reliability analysis is a statistical technique used to assess the consistency and stability of measurements or scales within a research study. In the context of the provided table, reliability statistics, specifically Cronbach's Alpha coefficients, have been computed to evaluate the internal consistency of three constructs related working environments: "Health and safety measures "Impacts on employees' performance," and "Solutions."

"Health and safety measures "The Cronbach's Alpha coefficient for this construct is calculated as 0.726, indicating good internal consistency. This suggests that the items or questions comprising the scale related to health and safety measures are highly correlated with each other, and they measure the same underlying construct reliably.

"Impacts on employee's performance": The Cronbach's Alpha coefficient for this construct is computed as 0.712, also indicating good internal consistency. Similar to the first construct, the items assessing the impacts on employee's performance demonstrate a high degree of internal reliability.

"Solutions": The Cronbach's Alpha coefficient for this construct is 0.705, which again suggests good internal consistency. The items measuring solutions related to health and safety issues in working environment exhibit strong inter-correlations, indicating that they reliably measure the intended construct.

A Cronbach's Alpha coefficient value closer to 1.0 indicates higher internal consistency, suggesting that the items in the scale are strongly correlated and measure the same underlying construct reliably. In this analysis, all three constructs demonstrate Cronbach's Alpha coefficients above 0.7, which is commonly considered acceptable for research purposes. Therefore, the reliability of the scales assessing health and safety measures, impacts on employee's performance, and solutions is deemed satisfactory. The reliability analysis presented in table 4.2. Indicates that the scales used to measure health and safety measures, impacts to the employee's performance, and solutions exhibit good internal consistency. This suggests that the items comprising each construct are reliable and effectively capture the intended aspects of health and safety management in the working place. Researchers and practitioners can have confidence in the consistency and stability of these measurement instruments when conducting further analyses or drawing conclusions based on the collected data.

Descriptive analysis

Mean interpretation

Table 4.3 highlights a summary of the mean achieved in the statements of the three objectives. From this analysis, it is established that all of the statements achieved a standard deviation of less than 1. This implies that there is lower dispersion or variation in the responses. The respondents had similar views on the various elements that they were questioned on. To establish the essential health and safety measures in the organization.

Table 4. Mean Interpretation.

Weight	Mean value	Interpretation
1	1.62 – 3.85	Strongly agree
2	1.52 – 3.41	Strongly agree
3	1.18 – 3.47	Strongly agree
Standard deviation		
1	<1	Lower dispersion
2	<1	Lower dispersion
3	<1	Lower dispersion

In this research, the first objective was to assess the essential of the existing health and safety measures in the organization (GCLA). The quantitative method was employed in the evaluation of this. The Likert scale questions were used to evaluate this.

This section describes the outcomes of this objective based on the quantitative analysis. Based on the Likert scale option, the respondents were asked on their opinion on whether there is a clear, working and well-known safety and health measures in their working environment. The table 4 presents descriptive statistics related to the assessment of essential health and safety measures existing in the organization. The analysis aimed to evaluate various aspects of health and safety measures, including the clarity of guidelines, regulatory and enforcement mechanisms, training, procedures during emergency and content moderation, and the presence of necessary health and safety equipment and the related resources.

Table 5. Essential health and safety measures in the organization in organization

Key:
1:Strongly Agree; 2:Agree, 3:Neutral 4:Disagree, 5:Strong Disagree

To assess the essential health and safety measures existing in the organization	N	Mean	Std. dev	Overall rating
Are there clear health and safety guidelines in place at the organization?	100	2.62	0.9264	Agree
Is there a dedicated team or department responsible for health and safety?	100	2.21	0.7254	Agree
Are employees trained regularly on health and safety protocols?	100	2.15	0.6824	Agree
Are there clear emergency safety protocols in working place that the employees aware with them?	100	2.75	0.4426	Agree
Do you feel that the workplace provides the necessary health and safety equipment and resources?	100	2.17	0.6225	Agree

Clarity of guidelines and regulation

Respondents were asked to assess the clarity health and safety guideline governing the organization. The mean score for the statement "is there clear health and safety guidelines in place at the organization "is 2.62, with a standard deviation of .9264. This indicates that, on average, respondents tend to agree that there are clear and existing guideline, as the mean falls closer to the "Agree" end of the scale. Overall, the assessment suggests a moderate level of agreement among respondents regarding the health and safety guideline and regulations in organization.

Enforcement mechanisms

The analysis also evaluates whether existing guideline and regulation in the organization have special department responsible for enforcement in the organization. The mean score for this statement is 2.21, with a standard deviation of .7254, indicating a slightly stronger agreement compared to the previous statement. Respondents tend to agree that there is a responsible department that enforces the health and safety practices in the organization these issues, albeit to a lesser extent than the clarity of regulations.

Health and safety training

Respondents were asked to assess whether there is regular training on the health and safety procedures in the working place. The mean score for this statement is 2.15, with a standard deviation of .6824, indicating a slightly less level of agreement as the previous statement. Most respondents agree that there is regular training that address the health and emergences procedure in the organization, although the agreement is slightly weaker.

Clarity of emergency safety protocols

The analysis examines whether there are clear procedure and protocol what action to be taken during the emergences in the organization and the other related working area that prevention of high impacts. The mean score for this statement is 2.75, with a relatively low standard deviation of .4426. This suggests a higher level of agreement among respondents that there are clear protocols and procedure to achieve a safe operation during emergency that could prevent harm.

Existence of health and safety equipment's

Finally, respondents were asked to assess whether there are feels there are provided necessary health and safety equipment's and the related resources according to the regulation and guideline in the organization. The mean score for this statement is 2.17, with a standard deviation of .6225, indicating a moderate level of agreement. Most respondents agreed that they feel that there are a provision of necessary safety and healthy equipment and related resources, although the agreement is not as strong as for other aspects assessed.

Table 6. Impacts the health and safety measures implemented to employee performance.

Key:

1:Strongly Agree; 2:Agree, 3:Neutral 4:Disagree, 5:Strong Disagree

To assess the health and safety measures implemented and their impact on employee performance in the organization	N	Mean	Std. dev	Overall rating
Do you believe that the current health and safety measures in the organization help improve employee performance?	100	2.72	0.6318	Agree
Have you experienced any improvement in your work performance as a result of health and safety initiatives?	100	2.23	0.6516	Agree
Do you feel more motivated and productive in a safe working environment?	100	2.48	0.6684	Agree
Do you believe that health and safety measures help reduce stress or anxiety at work?	100	3.29	0.4782	Neutral
Are there any areas of the workplace where you feel health and safety measures could be improved to enhance your performance?	100	2.21	0.6824	Agree

Source: Field data, 2025

Under the second objective, the research sought to evaluate the impacts of implemented health and safety measures in the organization with the performance of the employee in GCLA. This also was also evaluated based on the Likert scale questionnaire which evaluated various elements on the relationship between health and safety measures and employee performance. Quantitative analysis of the data collected was done and the results are presented in this section. It has been suggested that the implementations of robust health and safety practices may significantly benefits organizations by enhancing employee well-being, increasing productivity, and reducing costs. In Tanzania specifically in GCLA, where it is found to be one that contains hazards in working environment, the evaluation on the implementation of health measures and its impacts to the employee is crucial. The study surveyed a sample of 100 respondents, employing a rating scale from "Strongly Agree" to "Strongly Disagree" to gauge perceptions regarding various aspects of employee performance.

Positive Impact on organization performance

The mean score of 2.72 indicates agreement among respondents regarding the positive impact of the health and safety measures implemented in the organization towards the improvement of the performance. This suggests there is noticeably and satisfaction with the current measures.

Positive Impact on individual performance

With a mean score of 2.23 and a low standard deviation of 0.6516, respondents lean also towards agreement regarding the how the individual performance have been changed with the existing of the health and safety working place through the implementation of measures existing. This indicates a prevalent sentiment that the existing measures may be adequately accommodate diverse issues in health and safety.

Increased motivation of Employee

The mean score of 2.48, coupled with a relatively high standard deviation of 0.6684, suggests a divergence on self-opinions regarding whether they fell motivation on the working environment and other regulations. While the average indicates agreement, the variability in responses implies differing experiences or perceptions among respondents.

Positive impact in stress and comfortability

Respondents' express neutrality mean score of 3.29 regarding whether health, safety and regulations give the positive impact on the stress related to the working conditions. The moderate standard deviation of 0.4782 suggests varying degrees of ambivalence among participants.

Effectiveness in addressing health and safety measures

The mean score of 2.21 indicates agreement regarding the effectiveness of regulations and

measures on health and safety addressed in the organization. This sentiment is reinforced by the standard deviation of 0.6824, signifying a consistent of confidence on measures addressed.

Compensations in case of negative effects

With a mean score of 1.56 and a standard deviation of 0.7845, respondents strongly agree that a there is need of compensation to the employee in case of any side negative impact of the employee have been caused due to un safety and healthy working condition and this could rise the molarity of employees. This indicates a strong belief in the importance of procedural fairness, responsibilities and justice.

Collaboration between communities and Authorities

The mean score of 2.28 suggests agreement that collaboration communities, employers and health and safety at working place in Tanzanian authorities in addressing the challenges contributes to the promotion healthy and safety working condition as well the performance. The relatively low standard deviation of 0.7120 indicates a relatively consistent level of agreement among respondents.

Inferential analysis

Regression analysis

Regression analysis was conducted to analyze the relationship between the variables under study. This implies that the regression analysis conducted in this research evaluated the relationship between health and safety measures and employee's performance. The results are summarized in the table 7:

Regression analysis is a statistical technique used to examine the relationship between one dependent variable and one or more independent variables. It seeks to model the relationship between the variables, understand the strength and nature of that relationship, and make predictions based on the observed data. The regression analysis conducted in this research sought to establish the relationship between health and safety measures and employee performance. The regression analysis revealed a moderate positive relationship (R = 0.930) for the predictor, health and safety measure and employee performance in GCLA. The adjusted R Square value (0.628) indicates a reliable estimate considering the number of predictors and sample size. The analysis also established the Durbin-Watson statistic (0.522) suggesting a potential presence of autocorrelation in the model's residuals. This implies that there is still possibility of future research on the topic.

Table 7. Model Summary

Model summary					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	0. 930[a]	0.865	0.628	3.58100	0.522

a. Predictors: (Constant), Health and safety measures; b. Dependent Variable: employee performance

Source: Field Data (2025).

Table 8. ANOVA

ANOVA [a]						
Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	Regression	1412.226	13	715.726	51.230	0.0001[b]
	Residual	1726.134	87	13.476		
	Total	3138.36	100			

a. Dependent Variable: employee performance; b. Predictors: (Constant). Health and safety measures

Source: Field Data (2025).

Table 9. Coefficients

Coefficients [a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	16.616	1.654		10.046	0.0001
	Employee performance (X_1)	0.493	0.060	0.576	8.161	0.0001

(a & b) i.e. a. Dependent Variable: Employee performance, b. Independent Variable (Constant). Health and safety measures

Source: Field Data (2025).

The study also conducted ANOVA analysis to establish the relationship between the variables. ANOVA, also known as analysis of variance, is a statistical technique employed to examine the disparities between the means of different groups within a given sample. ANOVA is especially advantageous when comparing more than two groups. The fundamental concept is to divide the overall variability in the data into distinct origins in order to evaluate the statistical significance of differences in group means. The ANOVA results indicate that the regression model, health and safety measures as predictors, along with a constant term, significantly explains the variance in employee performance in GCLA. The F-value of 51.230, with a corresponding p-value of .000b, demonstrates a highly significant relationship between the predictors and employee performance in GCLA.

The coefficient for employee performance is 0.493, implying that for every one-unit increase in health and safety measures, there is an estimated increase of 0.493 units in the employee performance. It is thus established that health and safety measures have a positive impact on the employee performances, with p-values less than 0.05, highlighting its significance in management of health and safety at working places.

Thematic analysis

This part focuses on the examination of qualitative data. Qualitative data was gathered interview interviews. Nine respondents were interviewed for the study, and their comments were subsequently transcribed. The data in this study underwent examination through the first construction of codes. The codes were utilized to establish theme groupings for research purposes. The investigation revealed three primary themes that were consistently observed: enhanced employee productivity, improved employee morale and job satisfaction and compliance and reputation benefits. The data was transformed into cohesive and comprehensible textual components, such as sections, quotations, and individual words (Table 10).

Table 10. Themes

General issues recorded from interviewer	Themes
✓ The general awareness of stakeholders regarding the various guidelines and the importance of occupational health and safety ✓ Employee performance is influenced by several factors, but health and safety play a critical and central role	Enhanced employee productivity
✓ Positive link between safety and healthy with productivity, Interviewees consistently emphasized that a healthy and safe working environment significantly boosts employee morale, concentration, and overall productivity. ✓ Workers feel more secure and motivated when safety and health is prioritized.	Improved employee morale and job satisfaction
✓ Compliance with national and international occupational health and safety standards helps the organization avoid legal penalties, sanctions, and disruptions in operations ✓ Consistent adherence to safety regulations strengthens the organization's standing with regulatory bodies and builds trust with stakeholders ✓ Maintaining high health and safety standards enhances the organization's reputation as a responsible and professional institution	Compliance and reputation benefits

A detailed thematic analysis was conducted to explore and interpret recurring patterns and key themes that emerged from the qualitative responses related to the implementation of health and safety measures and their perceived impact on organizational performance. The process involved systematically coding the responses, categorizing them into relevant themes, and analyzing the data to extract meaningful insights.

The first dominant themes identified was a widespread awareness among participants of the existing occupational health and safety standards and guidelines within the organization. Respondents consistently indicated that they were well informed about these safety protocols and recognized their critical importance in maintaining a secure and efficient working environment. The data analysis indicates that there was a strong association between

a safe and healthy work environment and increased employee productivity. The findings indicate that significant number of participants (100%) reported that when they worked in conditions that prioritized their health and safety through adequate equipment, proper procedures, and minimal exposure to risks they felt more motivated, focused, and capable of performing their tasks effectively. This perception underscores the belief that investing in health and safety measures is not only a regulatory requirement but also a strategic factor in enhancing organizational performance

The second major theme identified through the thematic analysis is the strong relationship between the working environment and employee productivity that, respondents consistently emphasized that the quality of the work environment plays a critical role in influencing how employees perform their duties. A key insight that emerged is that a healthy and safe working environment contributes significantly to improving employee morale and job satisfaction. Furthermore, participants noted that when they feel physically safe, supported, and valued in their workplace, they are more likely to remain motivated, engaged, and committed to their responsibilities. Overall, this theme highlights the crucial role that a safe and healthy working environment plays in enhancing both the emotional well-being and performance capacity of employees within the organization.

The third key theme that emerged from the analysis pertains to the compliance and reputation benefits that effective health and safety measures bring to the organization. Respondents consistently indicated that maintaining strong occupational health and safety standards enables the organization to comply with national laws, regulatory frameworks, and international safety guidelines. This compliance is crucial in helping the organization avoid a range of negative consequences, such as legal penalties, regulatory sanctions, fines, and even potential shutdowns due to non-compliance. Furthermore, participants highlighted that adherence to health and safety regulations plays a strategic role in strengthening the organization's credibility and reputation. This theme highlights the dual significance of health and safety practices that not only as essential mechanisms for protecting and maintaining smooth operational activities, but also as powerful tools for enhancing the organization's reputation and reinforcing its credibility and identity within both the professional community and the wider public sphere.

DISCUSSION

To establish the essential health and safety measures in the organization.

The first objective of the research was to establish the essential health and safety measures in the organization in GCLA. The health and safety in working environment have been very important from the past century up to now since it protect the lives of the employee. In Tanzania, like in numerous other nations, the proliferation of inadequate of health and safety measure necessitated the establishment of laws, guidelines and regulations to enforce and oversee its utilization in working environments. As literatures highlights that Tanzania, like to numerous other countries, faces the challenge of implementation these health and safety measures in organization that may obstruct the organization productivity. Tanzania's government has enforced multiple laws and regulation to combat dangerous working environment, compensation for the case of injuries that occurs at work and creating the conducive working environments. The purpose of these regulations is to preserve the rights of employee and improving the productivity of the individual as well the organization. Achieving the appropriate equilibrium is essential in maintaining the health and safety environment and to preventing the rapid escalation due to new hazards.

It is established in the research that there are clear and well-known rules and regulations governing the health and safety in working environments in Tanzania, furthermore these rules and regulation have been reviled to be known in GCLA as well. The regulations implemented govern and control the hazards and dangerous at working environments in Tanzania. This is in line with a study conducted by Nkuba & Mtebe, (2023), Naji *et al.* (2021), Zahra (2025) who established that Tanzania's health and safety measures have been in place in Tanzania and for the organization with the objective of safeguarding the employee and improve the productivity of the organization. The government has implemented measures to guarantee organization comply with health and safety measures, thereby avoiding accidents, injuries, and illnesses in the workplace. Nevertheless, the effectiveness of these measures is continuously evaluated due to the dynamic nature of technology that changes the working place and its nature, which presents difficulties in upholding a strong measures (Hou *et al.*, 2021). This supports the findings of the research that there are clear and well-known roles and regulations governing health and

safety at working place in Tanzania as well to the GCLA.

It is also established in the research that existing enforcement mechanisms in Tanzania that enforces the health and safety rules and regulations in organizations but with some drawback that may hinder the enforcements. Also, it has been established that in recent years, the role of occupational health and safety (OHS) enforcement mechanisms in Tanzania has gained attention, particularly regarding how they impact organizations and ensure compliance with regulations. The study of Gervas & Timmo (2023), Bhat (2022), Balker (2023), Pub (2025), Vitrano (2024) support this as highlighted that there are inadequate enforcements by OSH that that need improvement. Furthermore, the study of Khassim & Costapius, (2025) that assessed how the local government adherence and compliance with occupational health and safety standards in Tanzania, the study highlights there is insufficiently adhering of measures due to factors such that individual, institutional, economical and leadership factors. Effective enforcement mechanisms are critical in maintaining order and promoting ethical practices within various sectors, including businesses, non-profits, and government agencies.

Therefore, the research highlights that existing enforcement mechanisms by OSHA in Tanzania are vital for ensuring organizations adhere to roles and regulations. While challenges remain, ongoing efforts to improve enforcement strategies are encouraging. As agencies continue to strengthen their monitoring capabilities and foster collaborative relationships with the private sector, Tanzania can create a more conducive environment for sustainable development and ethical practices within organizations.

The establishment weather there is regular training regarding the occupation health in the working place, the findings established that there is existence of training from OSH and internally within organization that show the improvement within the organization productivity. The study of Bautista-Bernal et al., (2024); Organization, (2024) reveal that OSH training not only benefits employees' safety but also enhances overall organizational efficiency.

On the emergency and safety protocol in the organization, it is established that there is existing of protocols that gives the procedures on the action during the emergency, furthermore it is found that there is need for the regular practices that could improves the employee preparedness. The studies of Purba et al., (2025); Zahra et al., (2025) supports that the emergency awareness is considered a crucial factor that influences employee preparedness in facing workplace incidents and contributes to the improvement of occupational safety and health (OSH) performance. The study shows that that the level of emergency awareness varies across companies and is influenced by training, risk communication and organizational safety culture. Through improving OSH performance can be achieved through the holistic development of emergency awareness, integrating both technical and psychosocial aspects within GCLA work environments.

Finally, the study established on the existence of the health and safety equipment's in the organization, the findings shows that there is satisfactory supporting equipment in the organization. Health supportive equipment and tools in an organization play a crucial role in enhancing workplace safety, preventing injuries, and promoting employee well-being, but according to the study of Darusman et *al.*, (2024) shows that employee behavioral may prevents the form using personal protective equipment (PPE).

The presence of health supportive equipment and tools in the GCLA plays a vital role in enhancing both safety and organizational performance. By equipping employees with essential PPE, such as lab coats, gloves, safety goggles, and respirators, the laboratory significantly reduces the risk of exposure to hazardous chemicals and biological agents. Additionally, tools like fume hoods, emergency eye wash stations, fire extinguishers, and first aid kits ensure quick responses to accidents, thereby minimizing injury and operational downtime. This not only safeguards the health and well-being of staff but also promotes a safe working environment that enhances employee confidence and productivity. As a result, the consistent use and maintenance of these safety tools contribute directly to the efficiency, accuracy, and credibility of laboratory operations, reinforcing the institution's commitment to safety, compliance, and high performance.

The existence of health and safety regulations in the GCLA demonstrates a foundational commitment to employee well-being, there remains a significant need for improvement and stronger enforcement mechanisms. Gaps in enforcements, inconsistent compliance, and limited awareness among staff can undermine the effectiveness of existing safety measures. To address these challenges, the organization must strengthen its monitoring systems, improve regular training, and ensure accountability at all levels. By reinforcing adherence to health and safety regulations through robust enforcement strategies, the organization can create a safe and healthy working environment that not only reduces occupational risks but also enhances

employee morale, productivity, and overall organizational performance.

To assess the health and safety measures implemented and their impact on employee performance

The second objective of the research was asses the health and safety measures implemented in the GCLA how it impacts the employee performance as well the organization. This was also analyzed both inferentially and thematically. The regression analysis conducted in this research established the relationship between health and safety measures and employee performance in GCLA. The regression analysis revealed a moderate positive relationship (R = 0.647) for the predictor, health and safety measures and employee performance in GCLA. Approximately 52.5% of the variance in the employee performance and health and safety measures (R Square = 0.525). The adjusted R Square value (0.628) indicates a reliable estimate considering the number of predictors and sample size.

Research has established that implementing health and safety measures in GCLA has positively impacted the organization's performance. Research conducted in Tanzania has established that the implementation of health and safety measures in the Government Chemist Laboratory Authority (GCLA) has positive impact on the organization's overall (Benson et al., 2024; Kajumulo et al., 2024; Materu et al., 2023). The adoption of safety protocols, provision of personal protective equipment, regular risk assessments, and emergency preparedness plans have significantly reduced workplace accidents and health-related absences. As a result, employees operate in a more secure and supportive environment, leading to increased efficiency, improved accuracy in laboratory work, and greater job satisfaction. This correlation between a safe working environment and enhanced performance highlights the importance of continuously investing in and upholding occupational health and safety standards within GCLA to sustain and further improve institutional productivity and service delivery.

The establishment on whether the implemented health and safety measures have the impact on individual employee performance, also it is found that there is a positive relationship between the two attributes that through providing a safe and secure working environment, the use of personal protective equipment, regular safety training, emergency response systems, and proper handling procedures for hazardous materials, the employees experience reduced health risks and absenteeism. The study of Benson et al. (2024) on the examination of the impacts of working environment with job satisfaction based on the oil and gas industry reviles that there is a necessity for organizations to prioritize work-life balance, enforce stringent safety measures, and foster a collaborative work culture to enhance overall job satisfaction that improve the employee performance. This supportive environment enables staff to concentrate more effectively on their tasks, work with increased confidence, and maintain higher levels of productivity and accuracy. As a result, employee motivation, job satisfaction, and overall performance have improved significantly, highlighting the critical role that health and safety practices play in promoting human capital efficiency within the organization.

On the positive impact in stress and comfortability, also this study established that the average response on whether the working environment can minimize stress and enhance the comfortability of the work, the response where neutral that neither agreed nor disagree due to the factor that the comfortability and stress at working place is contributed with several factors including the working environment. The study conducted by Burbar, (2021), Dullah et al., (2023), and Rachman, 2021) support the findings as it highlights that because stress and discomfort often stem from broader organizational and psychological factors that go beyond physical conditions. For example, an employee may work in a modern, hazard free office with excellent ventilation and ergonomic furniture, yet still experience high levels of stress due to poor management, excessive workloads, and lack of job security, unclear expectations, or toxic interpersonal dynamics. Mental and emotional stressors such as lack of recognition, limited opportunities for career growth, or pressure to meet unrealistic targets cannot be resolved by physical improvements alone. Therefore, while safety and health measures are necessary, they are not sufficient to ensure employee well-being unless combined with effective leadership, supportive work culture, and fair employment practices.

Furthermore, in this second objective the study aimed to establish the whether the existing health and safety measures need any improvement according to the nature of the working environment, the response also show that there is need for the improvement that significant that there is a gap in the implementation of heathy measures in the organization. In Chemistry laboratories handle hazardous chemicals, flammable substances, and complex equipment that pose constant threats to human health and environmental safety if not managed properly, therefore there is need to regular updates health and safety measures in

an organization. According to the study of Anklam et al. (2022) states that a scientific techniques, materials, and technologies evolve, outdated safety protocols may no longer be sufficient to mitigate emerging risks, moreover regulations and international safety standards are continuously being revised to reflect new research and best practices. Ultimately, regular updates improvement protects not only the employees but also the integrity of organization, the surrounding community, as well the reputation of organization.

It underscores that unsafe health practices because significant harm an estimated 1 in 10 patients' experiences avoidable adverse events during care, and approximately half of these could be prevented. Moreover, the report reveals that while over 70% of countries have made notable strides in occupational health and safety for healthcare workers, only about one-third have fully developed national action plans for patient safety (Organization, 2024). This disparity highlights the urgent need to broaden and update health and safety frameworks beyond basic infrastructure to include comprehensive policies, staff education, patient engagement, and adequate funding to ensure effective implementation.

This objective the study stablished the finding for the public awareness on the important of health and safety measures in the organization, the finds show that there is awareness to the public but the effort is required that makes them to involve in health and safety measures planning and implementation. Based on analysis of the state of occupational health in Tanzania's working industry, regardless of established standards and regulations, Mrema *et al.* (2015) discovered that the authorities in charge were not enforcing them adequately, leaving most workers unprotected. Furthermore, the study emphasizes that the current laws and regulations are inadequate to satisfy international standards and require changes. By comparing with a similar study, it is clear that the Tanzanian industry has increased the level of awareness regarding occupational health, but that more work is still needed to achieve the international standard (Khassim & Costapius, 2025) . This objective's results are consistent with earlier studies, which found that occupational health and public awareness have improved, but more work is still needed because development is causing changes to the workplace environment.

On the enforcement mechanism from the independent oversight department, the study establishes that there is well-known department which is Occupational Safety and Health Authority (OSHA) that oversee and control the implementation of measures in Tanzania organization especially GCLA. Although the authority has established procedures for monitoring and addressing non-compliance, implementation remains inconsistent for some organization. In some cases, enforcement actions are taken appropriately and promptly, while in others, there are noticeable delays or a lack of follow-through. Furthermore according to the study of Khassim & Costapius, (2025) cements that the OHS committee lacked full support to execute their duties concerning employee's wellbeing as they had limited resources to conduct trainings to employees as well as presence of few OSH equipment in the organization. OSH practices are important not only for stakeholders within the organization but also for third parties who may be affected by workplace activities (Estadilla, 2025). For this reason, the law mandates that every organization establish clear guidelines, rules, and effective OSH practices to ensure a safe and healthy working environment.

Furthermore, this objective also aimed to establish stakeholder perspective whether there is compensation on case of any emergence injury that happen in working environment. The findings reveal that although respondents are aware of the legal provision for compensation in the event of a workplace injury, they critically noted that the compensation offered is inadequate. Many expressed concern that the current compensation does not sufficiently cover the medical, financial, and long-term impacts of injuries, highlighting a gap between policy and the actual needs of affected workers.

Finally, the study establishes the collaboration of stakeholders with the organization in improving the health and safety, the study established there is slight coloration between them that need improvement. The study finds strongly supports that active collaboration between stakeholders and the organization significantly enhances workplace health and safety outcomes. The stakeholders include employees, management, regulatory bodies, and external health and safety consultants that play a crucial role in identifying risks, developing preventive measures, and fostering a culture of safety. Other study findings indicate that when these groups engage in open communication, share responsibility, and contribute their expertise, organizations are better equipped to implement effective safety protocols and respond promptly to hazards (Adekanmbi et al., 2024; Rantsatsi et al., 2020). Furthermore, the study of Ganeshu et al., (2024) highlights that inclusive stakeholder participation leads to increased compliance with safety regulations, higher employee morale, and a measurable reduction

in workplace accidents. This collaborative approach not only strengthens the organization's overall safety framework but also demonstrates a shared commitment to protecting the well-being of all personnel.

CONCLUSION

The findings strongly indicate that respondents agreed with all the general questionnaire items aimed at assessing the need for improvement of health and safety measures within GCLA. Despite acknowledging the existence of established safety protocols and systems, the respondents consistently expressed that there is still a significant need for further improvement and enhancement. This agreement reflects a shared understanding that while basic health and safety measures are in place, they may not be sufficient to address emerging risks, evolving workplace demands, or gaps in implementation. The call for improvement stems from the need to ensure continuous safety compliance, upgrade outdated equipment, strengthen training programs, and incorporate psychosocial support mechanisms to address mental well-being. This perspective underscores the importance of not becoming complacent with existing standards, but rather striving for a more robust, responsive, and comprehensive health and safety system. Improving these measures is essential not only for maintaining regulatory compliance but also for promoting a safer, more productive, and employee centered work environment that drives long term organizational performance.

Research contributions

This study makes a significant contribution by emphasizing the crucial role of health and safety measures in improving employee performance and general organizational effectiveness, particularly in hazardous workplaces such as the Government Chemistry Laboratory Authority (GCLA). It offers empirical proof that supports the connection between organized health and safety system and increased productivity, job satisfaction, and employee retention. Additionally, the study provides helpful stakeholder insights, highlighting both the positive aspects and potential areas for improvement in current safety protocols. These findings add to the current knowledge by highlighting the necessity for constant assessment and improvement of workplace health and safety regulations. Additionally, the study offers data driven advice for establishing safer and more productive workplaces, making it a valuable tool for policymakers, safety officials, and management heads in comparable organizations.

Recommendations

Based on the findings of this study, several key recommendations are proposed to strengthen health and safety measures and enhance employee performance at the GCLA. First, the organization should focus on continually improving its existing health and safety measures regularly by updating safety policies, procedures, and equipment to comply with current technological and industry standards. Secondly, integrating mental health support programs and wellness efforts, the emphasis on treating the psychological elements of workplace safety, such as stress and worry and third, the study recommends GCLA to strengthen its monitoring and evaluation mechanisms to track the effectiveness of health and safety.

Area of future research

This research focused on evaluation on the impact of health and safety measures on the improvement of employee performance in GCLA. The study has established linear relationship between health and safety measures and employee performance. This implies that employee performance in GCLA is positively impacted by health and safety measures established in the organization. This study opens several avenues for future research aimed at further strengthening occupational health and safety practices and their impact on organizational performance. One potential area is an investigation into the psychosocial aspects of workplace safety, including how mental health, stress, and anxiety affect employee productivity in high-risk environments like chemical laboratories since this study found neutral response. Another area is the explore the economic impact of investing in advanced safety infrastructure and technologies, comparing cost-benefit outcomes across government laboratory, as well the role of digital safety management systems and data analytics in monitoring, reporting, and improving occupational health and safety compliance as the development of technology and the artificial intelligence in working place may be the solution to more dangerous work.

DECLARATIONS

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Data availability

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

Authors' contributions

The authors collected, analyzed and discussed the findings of the entire manuscript.

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The authors has no competing interests

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