

# Occupational Health and Safety Practices Among Frontline Medical Laboratory Staff in the Covid-19 Testing Centres in the Bono Region of Ghana

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## Abstract

**Background:** Medical laboratory personnel are exposed to various occupational risks, especially during the COVID-19 pandemic. Their role in testing COVID-19 patients puts them at risk of contracting the virus while handling specimens. This study aimed to assess the occupational health and safety practices of frontline medical laboratory staff in COVID-19 testing laboratories in Ghana's Bono region.

**Methods:** A cross-sectional study was conducted using purposive sampling among medical laboratory staff at five COVID-19 testing centers in the Bono region. Checklists, interview schedules and structured questionnaires were used for data collection. Data analysis was performed using SPSS 20.0.

**Results:** The study included 137 participants, with 85 (62.0%) aged between 21 and 30 years. Males constituted 96(70.1%) while females constituted 41(29.9%) of the study participants. Among the respondents, 55% reported having been infected with COVID-19 before vaccination, 30% after vaccination, and 15% both before and after immunization. The majority of participants (93%) emphasized the importance of adhering to occupational health and safety procedures. Furthermore, 97% believed that standard operating procedures should be regularly reviewed, and 91% agreed that rewards should be provided for following safety protocols.

**Conclusion:** The study revealed a positive attitude toward adherence to occupational health and safety protocols among frontline medical laboratory staff in COVID-19 testing centers in the Bono region of Ghana.

**Keywords:** Occupational Hazard, Covid-19 Infection, Safety, Risk, Hazardous, Pandemic

## 1. Introduction

Ensuring the well-being of workers in all job activities is essential for occupational health and safety [1]. The healthcare sector poses various hazards, including those associated with the Covid-19 pandemic, making it a high-risk environment [2]. Healthcare professionals, including laboratory staff, have been significantly impacted by the global effects of the pandemic, with increased risks to their health and lives [3]. Tragically, many have contracted the virus and lost their lives [4,5]. Additionally, healthcare workers face other workplace hazards, such as needle sticks and stress [5]. Frontline medical laboratory staff working in Covid-19 testing centers play a critical role and are at risk of contracting the virus. Providing them with the necessary information, tools, and biosafety practices are crucial for safeguarding their health [6]. Prioritizing employee health and safety is not only important for individuals and families but also has financial implications [4]. Approximately 12% of the global workforce, around 59 million individuals, work in

healthcare institutions face occupational risks [7]. These risks result in millions of illnesses and accidents among healthcare professionals, leading to significant economic consequences [8]. Sub-Saharan Africa, characterized by a scarcity of qualified professionals, challenging working conditions, and a high burden of infectious diseases, is particularly affected [9]. Medical laboratory staff, including laboratory workers, encounter various hazards, such as infectious aerosols, needle stick injuries, and exposure to chemical substances, which jeopardize their health and safety [10,11].

The Covid-19 pandemic has further exacerbated the risks faced by healthcare workers, including inadequate personal protective equipment, insufficient training, and heightened exposure [12,13]. Despite guidelines provided by the Ministry of Health, Ghana has witnessed a significant number of infections among healthcare workers, underscoring the need for evaluating and improving occupational health and safety practices [14]. This

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study aims to evaluate the occupational health and safety practices of frontline medical laboratory staff in the Covid-19 testing centers located in the Bono region of Ghana. The findings of this research will contribute to enhancing the overall occupational health and safety of healthcare workers and provide valuable insights in the fight against the pandemic [1]. This study also aims to bridge the research gap by examining the occupational health and safety procedures implemented among frontline medical laboratory staff working in Covid-19 clinics in the Bono region of Ghana [15].

## 2. Methods

### 2.1 Study Design and Site

The study was a cross – sectional study conducted from August 1 to September 30, 2022 in the Bono Region of Ghana. The study was conducted among frontline medical laboratory staff at five Covid-19 testing facilities in the Bono region of Ghana, namely the Sunyani Regional Hospital Covid-19 Centre, Wenchi Methodist Hospital Covid-19 Centre, Holy Family Hospital-Berekum Covid Centre, Dormaa-Ahenkro Presbyterian Hospital Covid-19 Centre, and Sampa Government Hospital.

### 2.2 Study Population

Front-line medical laboratory employees from the five Covid-19 testing sites in Ghana's Bono region was involved in the study.

### 2.3 Sampling, and Sample Size

Purposive sampling was used to carry out the investigation. The study consisted of 137 sample size

### 2.4 Inclusion Criteria

All members of the five Covid-19 testing sites in the Bono area of Ghana who agreed to participate in the study, including volunteers and interns involved in sample collection, processing, and testing.

### 2.5 Exclusion Criteria

At the time of data collection, any additional healthcare personnel or patients who were present in the lab was excluded. A participant's refusal to provide informed consent was also excluded.

## 3. Data Collection Tool

### 3.1 Instrument

The study was a quantitative research project that used an English-language checklist and a closed-ended questionnaire that were taken from the Ministry of Health's 2020 protocol and National Guidelines for laboratory testing and reporting on Respiratory Infectious Disease in Health Facilities in Ghana [16,17]. To ensure accurate replies, the questionnaire was self-administered to research participants who qualified. When necessary, participants received assistance. Sections "A," "B," and "C" made up the questionnaire's organizational structure. Participants' demographic information is included in Section "A," attitudes toward occupational health and safety procedures are covered in Section "B," and the availability of personal protective equipment is covered in Section "C".

### 3.2 Validity and Reliability

A validated questionnaire was used for the [16,17]. Ten members of the medical laboratory staff at Holy Family Hospital Laboratory in Techiman, a Covid-19 testing facility in the Bono East Region, pretested the questionnaire. To guarantee that an excellent report was generated using the respondents' replies, all questions were double-checked to see if they had been addressed by respondents. The research supervisor created and revised a proposal that acted as a guide for the research in order to ensure validity and reliability.

### 3.3 Data Collection Procedure

On the survey day, eligible participants gave their informed consents and received printed copies of the survey for self-administering. Participants who were having trouble comprehending the questions had them clarified to them. To make sure that all of the questions were properly addressed; the questionnaires were cross- checked. Participants were thanked for their time and effort.

### 3.4 Data Analysis

The International Business Machine Statistical Package for the Social Sciences Version 22.0 was used to examine the study's results once they had been input into Excel, copied onto a new excel sheet, and cleaned (SPSS 22.0). The demographic information of the research participants and the safety measures in place, which was depicted using a frequency and percentage distribution table, were analyzed using descriptive analysis. The availability of personnel protective equipment was examined using a Likert scale, and the results were represented by the mean, median, and standard deviation. The data on participant attitudes about workplace safety, which were depicted using a dichotomy table, were analyzed using multiple answers analysis.

### 3.5 Limitation of the Study

Getting more laboratory employees to participate in the study was exceedingly challenging because the majority of them were on vacation when the sample was obtained.

### 3.6 Ethical Consideration

The Kintampo Health Research Center ethics committee was consulted for Approval with an ID number KHRCIEC/2022-22. My research supervisor approved a draught of an introduction letter that I had written. The investigation was done with permission from the hospital administration and the medical directors of the several laboratories. The respondents were given our study's aim, objectives, relevance, advantages, and dangers after we received permission from the director of the department of many laboratories.

## 4. Results

### 4.1 Socio-Demographical Data Among Study Respondents

Out of (137(100%)) participants, majority were between the age group 21-30 years representing 85(62.00%) and the minority were between the age group 51-60 years representing 2(1.50%). Also, males outweighed females representing 96 (70.10%) and 41(29.90%) respectively in the study. Majority of the study participants were single, 94(68.60%) while minority of them

were either separated or living together representing 1(0.7%) each. Additionally, majority of the participants had had a tertiary education representing 128(93.40%) while the rest of the study participants had had secondary education representing 9(6.60%). Majority of the participants were technician representing 52(38.00%) while only 1(0.70%) participant being the minority was a doctor of medical Laboratory. Moreover, majority of

the participants have not had more than one year experienced representing 57(41.60%) while the minority of the participants have had more than 10 years of experience representing 17(12.40%). Furthermore, majority of the participants worked at the Bono regional Hospital representing 48(35.00%) while the minority of the participants worked at the Sampa regional Hospital representing 14(10.20%) as seen in table 1.

| Parameter   | N(X)        |
|---|-------------|
| Total   | 137(100.00) |
| <b>Age</b>  |             |
| >20   | 5(3.60)     |
| 21-30   | 85(62.00)   |
| 31-40   | 36(26.30)   |
| 41-50   | 9(6.60)     |
| 51-60   | 2(1.50)     |
| <b>Gender</b>                                       |             |
| Male  | 96(70.10)   |
| Female  | 41(29.90)   |
| <b>Marital status</b>                               |             |
| Married   | 38(27.70)   |
| Single  | 94(68.60)   |
| Divorced  | 3(2.20)     |
| Separated   | 1(0.70)     |
| Together  | 1(0.70)     |
| <b>Educational level</b>                            |             |
| Secondary   | 9(6.60)     |
| Tertiary  | 128(93.40)  |
| <b>Qualification</b>                                |             |
| Certificate   | 16(11.70)   |
| Technician  | 62(45.30)   |
| Data represented as frequency(N) and percentage (X) |             |

**Table 1: Socio-Demographical Data Among Study Participants**

#### 4.2 Assessing the Availability of Personal Protective Equipment in the Study Facilities

Based on the study findings, the majority of participants expressed disagreement with the statement regarding the availability of an adequate supply of surgical face masks for everyday work. The mean ( $\mu$ ) was 2.31, the median ( $\bar{x}$ ) was 2, and the standard deviation (SD) was 0.912. Similarly, most participants disagreed with the statement about the availability of adequate particulate filter respirators, such as P2 or N95 masks. The mean ( $\mu$ ) was 2.21, the median ( $\bar{x}$ ) was 2, and the standard deviation (SD) was 0.950. Regarding face shields, the majority of participants also disagreed with the statement about their adequacy.

The mean ( $\mu$ ) was 1.96, the median ( $\bar{x}$ ) was 2, and the standard deviation (SD) was 0.844. Furthermore, most study respondents expressed disagreement with the statement concerning the availability of adequate disposal gowns and aprons. The mean ( $\mu$ ) was 2.24, the median ( $\bar{x}$ ) was 2, and the standard deviation (SD) was 0.936. However, most respondents agreed with the statement regarding the availability of adequate gloves. The mean ( $\mu$ ) was 3.10, the median ( $\bar{x}$ ) was 3, and the standard

deviation (SD) was 0.877. In terms of goggles, the majority of participants disagreed with the statement about their adequacy. The mean ( $\mu$ ) was 2.09, the median ( $\bar{x}$ ) was 2, and the standard deviation (SD) was 0.903. On the other hand, most participants agreed with the statement about the availability of adequate hand sanitizers. The mean ( $\mu$ ) was 2.99, the median ( $\bar{x}$ ) was 3, and the standard deviation (SD) was 0.902. In relation to shoe covers and laboratory shoes, most respondents disagreed with their adequacy. The mean ( $\mu$ ) was 1.94, the median ( $\bar{x}$ ) was 2, and the standard deviation (SD) was 0.953. Moreover, most respondents agreed with the statement regarding the availability of adequate overall coats. The mean ( $\mu$ ) was 2.57, the median ( $\bar{x}$ ) was 3, and the standard deviation (SD) was 1.035. The majority of respondents also strongly agreed with the statement about the availability of an adequate biosafety cabinet. The mean ( $\mu$ ) was 3.91, the median ( $\bar{x}$ ) was 4, and the standard deviation (SD) was 1.056. Lastly, most study respondents agreed with the statement regarding the presence of a dead-air/PCR work station or UV box for PCR. The mean ( $\mu$ ) was 2.80, the median ( $\bar{x}$ ) was 3, and the standard deviation (SD) was 1.079 as seen in table 2.

| Survey Statement   | Strongly Disagree N (X) | Disagree N (X) | Agree N (X) | Strongly Agree N (X) | $\mu$ | SD    | $\bar{x}$ |
|--|-------------------------|----------------|-------------|----------------------|-------|-------|-----------|
| There are adequate surgical face masks for every day's work  | 27(19.7)                | 56(40.9)       | 39(28.5)    | 15(10.9)             | 2.31  | 0.912 | 2         |
| There are adequate particulate filter respirators (such as P2 or N95)  | 34(24.8)                | 56(40.9)       | 31(22.6)    | 16(11.7)             | 2.21  | 0.950 | 2         |
| There are adequate face shields  | 44(32.1)                | 61(44.5)       | 25(18.2)    | 7(5.1)               | 1.96  | 0.844 | 2         |
| There are adequate disposal gowns and aprons   | 30(21.9)                | 61(44.5)       | 29(21.2)    | 17(12.4)             | 2.24  | 0.936 | 2         |
| There are adequate gloves  | 9(6.6)                  | 19(13.9)       | 58(42.3)    | 51(37.2)             | 3.10  | 0.877 | 3         |
| There are adequate goggles   | 37(27.0)                | 64(46.7)       | 23(16.8)    | 13(9.25)             | 2.09  | 0.903 | 2         |
| There are adequate hand sanitizers   | 11(8.0)                 | 25(18.2)       | 55(40.1)    | 46(33.6)             | 2.99  | 0.902 | 3         |
| There are adequate shoes covers and Laboratory shoes   | 52(38.0)                | 55(40.1)       | 16(11.7)    | 14(10.2)             | 1.94  | 0.953 | 2         |
| There are adequate overall coats   | 24(17.5)                | 43(31.4)       | 38(27.7)    | 32(23.4)             | 2.57  | 1.035 | 3         |
| There is adequate biosafety cabinet  | 21(15.3)                | 20(14.6)       | 47(34.3)    | 49(35.8)             | 3.91  | 1.056 | 4         |
| There is dead-air/PCR work station or UV box for PCR   | 25(18.2)                | 21(15.3)       | 48(35.0)    | 43(31.4)             | 2.80  | 1.079 | 3         |
| Date represented as frequency (N), percentage (X), mean( $\mu$ ), standard deviation (SD) and median ( $\bar{x}$ ) |                         |                |             |                      |       |       |           |

**Table 2: A Likert Scale of the Distribution of the Availability of PPEs**

#### 4.3 Assessment of Participants' Attitude towards Occupational Health and Safety

The study findings indicated that all respondents (100%) expressed the belief that occupational health and safety should be taken seriously and receive proper attention. They also acknowledged that the prevention of occupational hazards is a shared responsibility between medical laboratory staff and hospital management, and all specimens should be treated as hazardous.

Additionally, all responses (100%) indicated that the wearing of Personal Protective Equipment (PPE) should be strictly adhered to in order to ensure good occupational safety. Additionally, respondents agreed unanimously that all exposure hazards should be documented and reported to the appropriate authorities.

Furthermore, 93% of the responses revealed that medical laboratory staff should bear the necessary burden of paying extra attention to occupational health and safety practices. 97% of the responses emphasized the need to regularly review standard operating procedures, and 91% of the respondents believed that incentives should be provided for adhering to standard safety protocols.

Moreover, 99% of the responses highlighted the importance of proper hand washing before and after each contact with a patient or patient's sample. The majority (99%) also stressed the need to follow standard operating procedures to ensure good occupational safety and expressed that proper ventilation in the laboratory is essential for maintaining occupational safety standards as seen in table 3.

| Statement  | Responses | Disagree N (X) |
|--|-----------|----------------|
|  | N         | X              |
| Occupational health and safety practices must be taken seriously and given the necessary attention.                  | 137       | 100.00         |
| Prevention of occupational hazards is a joint responsibility of medical laboratory and hospital management.          | 137       | 100.00         |
| All specimens must be treated as hazardous.  | 137       | 100.00         |
| Paying extra attention to occupational health and safety practices is a necessary burden on medical laboratory staff | 127       | 93.00          |
| Wearing of PPEs must have adhered to ensure good occupational safety practices.                                      | 137       | 100.00         |
| Proper hand washing is necessary before and after each contact with a patient sample                                 | 136       | 99.00          |
| There is a need to review standard operation procedures regularly?   | 133       | 97.00          |
| Standard operation procedures must be followed to ensure good occupational safety.                                   | 136       | 99.00          |
| Proper ventilation at the laboratory is required to ensure good occupational safety.                                 | 136       | 99.00          |
| All exposure hazards must be documented and reported to the appropriate authorities.                                 | 137       | 100.00         |
| Incentives must be awarded for adhering to standard safety protocols   | 137       | 100.00         |
| Total  | 1477      | 1078.00        |
| Data represented as frequency(N) and percentage(X)   |           |                |

**Table 3. Multiple Response Analysis of Study Participants' Attitude towards Occupational Health and Safety**

#### 4.4 Occupational Health and Safety Measures put in Place for Medical Laboratory Staff at the Study Facilities

According to the survey, 60% of the institutions acknowledged the availability of adjustable seats for microscope viewing. All facilities (100%) confirmed having sufficient lighting to illuminate all work areas, restriction signs for hazardous environments, thumb-operated pipettes, and installed fire extinguishers. Similarly, every facility (100%) reported proper labeling of chemicals and reagents with hazard symbols, adherence to regulations regarding flammable storage in approved containers, availability of dead-air/PCR work stations, and UV boxes for PCR.

In addition, the study revealed that at 80% of the facilities, workers handle, load, clean, and inspect centrifuges and rotors, while the presence of defective equipment and machines was observed. These facilities also have separate dedicated areas for

various diagnostic processes, including sample taking, nucleic acid extraction, master mix preparation, and amplification. Furthermore, 60% of the facilities reported having a biosafety cabinet, adequate laboratory space, and appropriate ventilation. The pressurized gas cylinders were securely fastened using restraining chains, bench clamps, or similar devices.

Moreover, it was discovered that 40% of the workers wore rings, watches, and other jewelry while working. Additionally, 60% of the facility's employees experienced prolonged standing at lab benches or hoods, while only 20% of the laboratories had a unidirectional flow design. Furthermore, 40% of the facilities regularly inspected and maintained their pressure vessels, and 20% of the laboratories had clear labels indicating the safe working pressure on all pressure vessels. Additionally, 60% of the laboratory employees were observed wearing hearing protection equipment as seen in table 4.

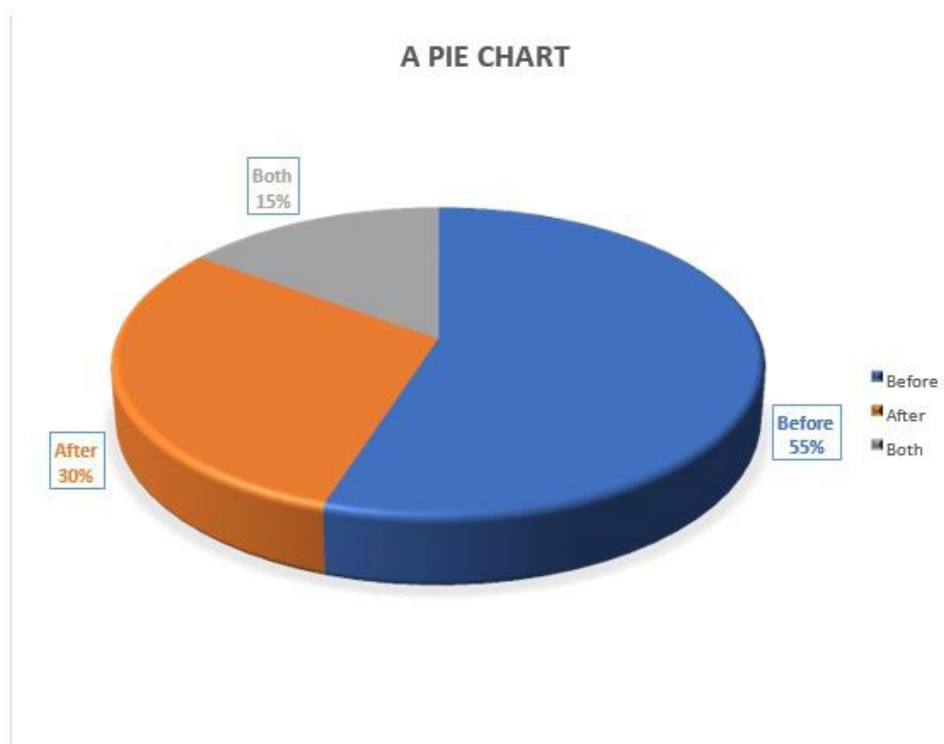
| Item  | N | X   |
|---|---|-----|
| Total   | 5 | 100 |
| Adjustable seats are available while using a microscope   |   |     |
| Yes   | 3 | 60  |
| No  | 2 | 40  |
| Is there enough light to illuminate every work area   |   |     |
| Yes   | 5 | 100 |
| No  | 0 | 0   |
| Lengthy standing at lab benches or hoods for employees  |   |     |
| Yes   | 3 | 60  |
| No  | 2 | 40  |
| Are workers utilizing hearing protection  |   |     |
| Yes   | 3 | 60  |
| No  | 2 | 40  |
| the presence of restriction signs for the dangerous environment or other critical safety work locations         |   |     |
| Yes   | 5 | 100 |
| No  | 0 | 0   |
| Employees handling, loading, maintaining, and inspecting centrifuges and rotors                                 |   |     |
| Yes   | 4 | 80  |
| No  | 1 | 20  |
| usage of thumb-operated pipettes  |   |     |
| Yes   | 5 | 100 |
| No  | 0 | 0   |
| Are all pressurised gas cylinders securely fastened with restraint chains, bench clamps, or anything comparable |   |     |
| Yes   | 3 | 60  |
| No  | 2 | 40  |
| Are all pressure containers labelled with the safe operating pressure   |   |     |
| Yes   | 1 | 20  |
| No  | 4 | 80  |
| Rings, watches, and other jewellery worn by workers while they are at work                                      |   |     |
| Yes   | 2 | 40  |
| No  | 3 | 60  |

|  |   |     |
|--|---|-----|
| Availability of defective equipment and machines   |   |     |
| Yes  | 4 | 80  |
| No   | 1 | 20  |
| Fire extinguishers installed   |   |     |
| Yes  | 5 | 100 |
| No   | 0 | 0   |
| Pressure vessels periodically inspected and serviced   |   |     |
| Yes  | 2 | 40  |
| No   | 3 | 60  |
| Are chemicals and reagents clearly labeled, including hazard symbols   |   |     |
| Yes  | 5 | 100 |
| No   | 0 | 0   |
| Storing flammables in unapproved plastic containers  |   |     |
| Yes  | 0 | 0   |
| No   | 5 | 100 |
| Laboratory space and ventilation good  |   |     |
| Yes  | 3 | 60  |
| No   | 2 | 40  |
| Is the laboratory design in a unidirectional flow  |   |     |
| Yes  | 1 | 20  |
| No   | 4 | 80  |
| Standard biosafety cabinet   |   |     |
| Yes  | 3 | 60  |
| No   | 2 | 40  |
| Is there an Incinerator Machine  |   |     |
| Yes  | 5 | 100 |
| No   | 0 | 0   |
| Are there separate and dedicated working areas for all diagnostic processes; sample taking, nucleic acid extraction, master mix preparation, and amplification |   |     |
| Yes  | 4 | 80  |
| No   | 1 | 20  |
| Is there a Dead-air/PCR workstation or UV box for PCR  |   |     |
| Yes  | 5 | 100 |
| No   | 0 | 0   |
| Data represented as frequency (N) and percentage(X)  |   |     |

**Table 4. Occupational Health and Safety Measures in Place for Medical Laboratory Staff at the Study Facilities**

#### 4.5 Participants in the Study's Covid-19 Vaccination Status

The majority of participants indicated that they had been contracted a Covid-19 infection prior to receiving the vaccination, accounting for 55% of the respondents. Additionally, 30% of the participants reported contracting the infection after being vaccinated. Only a small number of participants, representing 15%, reported having the infection both before and after receiving the vaccination as seen in figure 1.



**Figure 1:** Percentage Distribution of the Period Participants were Infected with Covid-19 Infection

## 5. Discussion

### 5.1 Socio-Demographical Data Among Study Respondents

The study focused on frontline medical laboratory staff at the five Covid-19 centers in the Bono region of Ghana. Among the 137 participants, the majority fell within the age group of 21-30 years, representing 62% of the total. On the other hand, the minority consisted of individuals aged 51-60 years, representing only 1.5%. In terms of gender, the majority were males, accounting for 70.1%, while females represented 29.9%. Regarding marital status, the majority of study participants were single, accounting 68.6%, while a small number of participants were either separated or living together, each representing 0.7%. These findings align with a previous study conducted by where the majority of respondents were in the age group of 19-30 years, representing 60.3%, and males constituted the majority group, representing 51.5% [18]. Furthermore, the majority of participants had attained a tertiary education, accounting for 93.4%, while the remaining participants had completed secondary education, accounting 6.6%. These finding were also consistent with the study conducted by where the majority of respondents also had tertiary education [18].

In terms of occupation, technicians were the majority among the participants, comprising 38%. On the other hand, there was only one participant, representing the minority, who was a doctor of medical laboratory. This finding differs from a study conducted by where the majority of respondents were biomedical scientists [10]. Regarding work experience, the majority of participants had less than one year of experience, accounting 41.6%. In contrast, the minority had over 10 years of experience, with 12.4%. These findings are inconsistent with the study conducted

by where the majority of respondents had 2-5 years of working experience [18].

### 5.2 Assessment of the Availability of Personal Protective Equipment at the Study Facilities

According to the study, majority of participants disagreed with the statement that there were adequate surgical face masks for everyday work ( $\mu = 2.31$ ,  $\bar{x} = 2$  with  $SD = 0.912$ ). Similarly, most participants disagreed with the statement that there were adequate particulate filter respirators (such as P2 or N95) ( $\mu = 2.21$ ,  $\bar{x} = 2$  with  $SD = 0.950$ ). Additionally, the majority of participants disagreed with the statement that there were adequate face shields ( $\mu = 1.96$ ,  $\bar{x} = 2$  with  $SD = 0.844$ ). These findings are inconsistent with a study conducted by Ababa (2021), where the availability of PPEs, including surgical face masks and respirators, increased during the Covid-19 pandemic compared to before. However, they are consistent with a study conducted by, which reported shortages of surgical face masks, respirators, and face shields during the pandemic [19].

In addition, most of the study respondents disagreed with the statement that there were adequate disposal gowns and aprons ( $\mu = 2.24$ ,  $\bar{x} = 2$  with  $SD = 0.936$ ). The majority of participants also disagreed with the statement that there were adequate goggles ( $\mu = 2.09$ ,  $\bar{x} = 2$  with  $SD = 0.903$ ). Similarly, most respondents disagreed with the statement that there were adequate shoe covers and laboratory shoes ( $\mu = 1.94$ ,  $\bar{x} = 2$  with  $SD = 0.953$ ). These findings align with a study conducted by [19].

Furthermore, the majority of participants agreed with the statement that there were adequate hand sanitizers ( $\mu = 2.99$ ,

$\bar{x} = 3$  with  $SD = 0.902$ ). Most respondents also agreed with the statement that there were adequate gloves ( $\mu = 3.10$ ,  $\bar{x} = 3$  with  $SD = 0.877$ ). These findings are in line with a cross-sectional survey conducted by [20]. Moreover, most respondents agreed with the statement that there were adequate overall coats ( $\mu = 2.57$ ,  $\bar{x} = 3$  with  $SD = 1.035$ ). This finding contradicts a study conducted by [21]. The majority of respondents also strongly agreed with the statement that there was an adequate biosafety cabinet ( $\mu = 3.91$ ,  $\bar{x} = 4$  with  $SD = 1.056$ ). Most study respondents agreed with the statement that there was a dead-air/PCR work station or UV box for PCR ( $\mu = 2.80$ ,  $\bar{x} = 3$  with  $SD = 1.079$ ). These findings align with the national guidelines for Covid-19 testing provided by the [16].

### 5.3 Assessment of Participants' Attitude towards Occupational Health and Safety

Based on the study findings, all participants' responses (100%) emphasized the importance of prioritizing and giving attention to occupational health and safety. They recognized that the prevention of occupational hazards is a shared responsibility between medical laboratory staff and hospital management, and they emphasized that all specimens should be treated as hazardous. Additionally, all respondents (100%) stressed the necessity of adhering to Personal Protective Equipment (PPE) usage for ensuring good occupational safety. They also highlighted the significance of documenting and reporting all exposure hazards to the appropriate authorities.

Furthermore, a significant majority of the responses (93%) indicated that medical laboratory staff should bear the necessary burden of paying extra attention to occupational health and safety practices. Similarly, 97% of the responses expressed the need for regular review of standard operating procedures, while 91% of the respondents believed that incentives should be provided for adhering to standard safety protocols. Moreover, an overwhelming majority of the responses (99%) underscored the importance of proper hand washing before and after each contact with patients or patient samples. They also emphasized the adherence to standard operating procedures to ensure good occupational safety and highlighted the requirement for proper ventilation in the laboratory. These findings align with a study conducted by, providing additional evidence of the significance of these occupational health and safety practices [18].

### 5.4 Occupational Health and Safety Measures in Place for Medical Laboratory Staff at the Study Facilities

According to a study, majority of workers in the facility are exposed to prolonged periods of standing at lab benches or hoods. Unfortunately, these conditions do not meet the Covid-19 testing center requirements set by the Ministry of Health [16]. Also, only a small number of laboratories have a unidirectional flow, clearly marked safe working pressure on pressure vessels, and regular inspections and servicing of pressure vessels. In terms of safety measures, the study found that 60% of the facilities examined confirmed having proper lighting, fire extinguishers, thumb-operated pipettes, and restriction signs for hazardous environments. Additionally, all facilities reported using flammables in unapproved plastic containers, labeling

chemicals and reagents with danger symbols, and having equipment such as incineration machines, dead-air/PCR work stations, or UV boxes for PCR. The study also revealed that 80% of the facilities have workers handling, loading, cleaning, and inspecting centrifuges and rotors, which may pose risks due to the presence of defective equipment and machines.

These facilities also have separate working areas for each diagnostic process, including sample taking, nucleic acid extraction, master mix preparation, and amplification. Furthermore, 60% of the facilities indicated the presence of a biosafety cabinet, adequate laboratory space, ventilation, and proper securing of pressurized gas cylinders. Additionally, 60% of the laboratory employees were observed wearing hearing protection devices, aligning with the Covid-19 testing center requirements set by the Ministry of Health [16]. In contrast, it was found that 40% of the respondents were wearing rings, watches, and other jewelry while working, which is consistent with a study conducted by [18]. This previous study highlighted the risk of electrical shocks when wearing such items around electrical appliances in laboratories.

### 5.5 The Period Participants were Infected with Covid-19 Infection

According to the Centers for Disease Control and Prevention, the COVID-19 vaccine provides protection for individuals, including adults and children aged 6 months and older, against the development of severe Covid-19 illness [22]. Vaccination is considered safe and effective, although it's important to note that no vaccine can guarantee 100% effectiveness. Some individuals who have received the Covid-19 vaccine may still contract the infection and become ill. This finding is consistent with the results of the current study. Among the participants, a majority reported having been infected with Covid-19 prior to receiving the vaccination, representing 55% of the respondents. Additionally, 30% of the participants indicated that they contracted the infection after being vaccinated. Furthermore, 15% of the participants responded that they had experienced the infection both before and after receiving the vaccination.

## 6. Conclusion

In conclusion, while frontline laboratory staff in Covid-19 testing centers in the Bono region of Ghana generally showed a positive attitude towards adhering to occupational health and safety practices for Covid-19, the study uncovered insufficient availability of disposal gowns, aprons, and particulate filter respirators (such as P2 and N95) for everyday activities in these centers. Furthermore, respondents expressed significant concerns regarding the need for incentives to be provided [23, 24].

### Recommendation

Recommendations based on the findings of this study are as follows: The Institutional Care Division of the Bono Regional Health Directorate and the administration of Covid-19 testing sites should ensure an adequate supply of personal protective equipment (PPE) for the laboratory staff. Facilities management should consider implementing yearly rewards or incentives as



a means to encourage laboratory staff to adhere to occupational health and safety protocols. The Institutional Care Division of the Bono Regional Health Directorate should organize regular workshops to educate laboratory employees on the proper use of various PPEs. Researchers should conduct further studies to develop a tool that can assess the attitudes of laboratory staff towards occupational health and safety practices.

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### Competing Interest

Authors have not competing interest

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