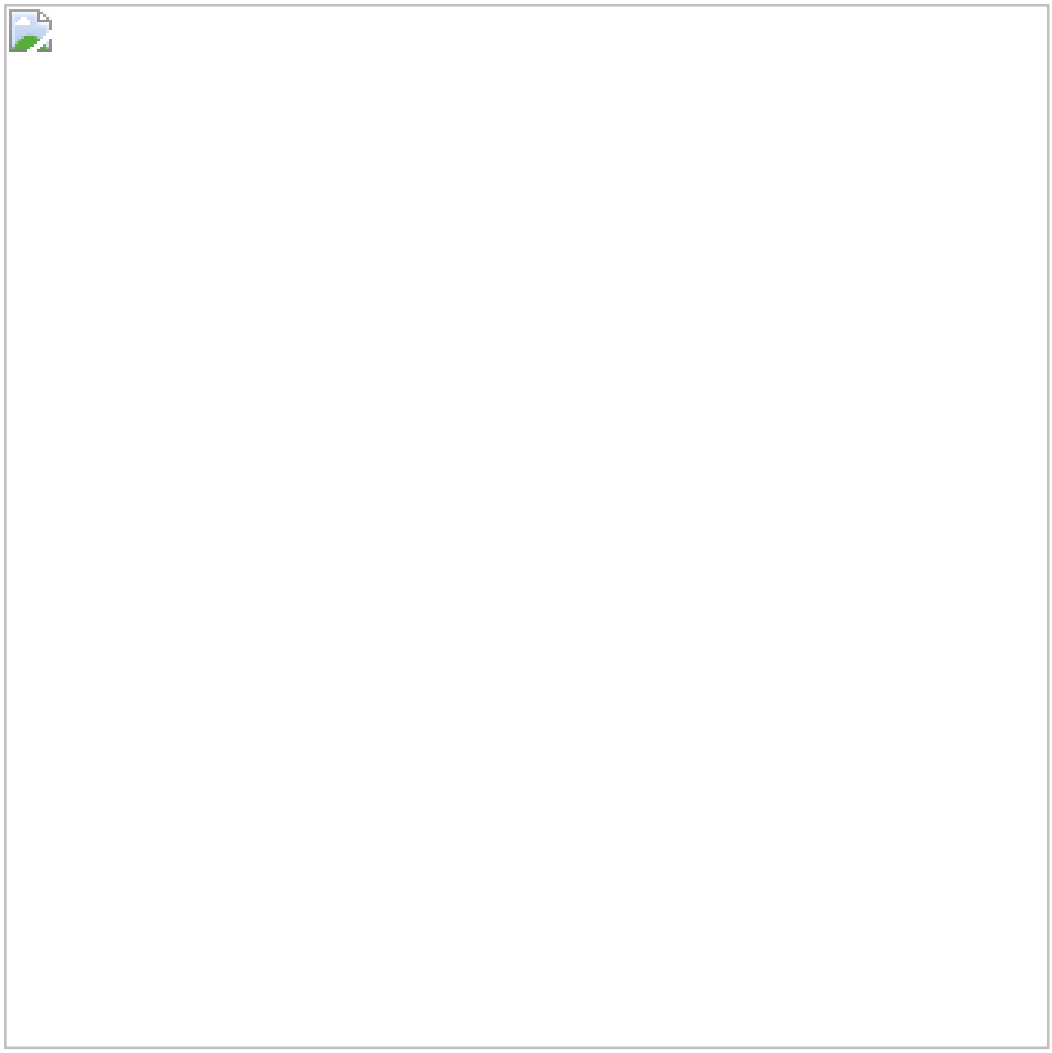

# Personal Protective Equipment Utilization and Determinant Factors Among Workers in Phibela Edible Oil Factory, West Gojjam, Ethiopia

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# Personal Protective Equipment Utilization and Determinant Factors Among Workers in Phibela Edible Oil Factory, West Gojjam, Ethiopia

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## ABSTRACT

**BACKGROUND:** An edible oil factory is a labor-intensive and technologically complex industry, with workers potentially exposed to a variety of dangers associated with such industries. Personal protective equipment is a universal, legal requirement, and an important strategy for preventing occupational injuries and illnesses caused by workplace hazards. However, such industries receive little attention, especially in Ethiopia.

**OBJECTIVE:** To assess personal protective equipment utilization and its associated factors among workers in the PhiBela edible oil factory in Burie, Ethiopia, in 2022.

**METHODS:** A cross-sectional study was employed among the PhiBela edible oil factory workers in Burie. A simple random sampling technique was used to select 389 PhiBela edible oil factory workers. Face-to-face interviews and self-administered structured questionnaires were used to collect data on workers' protective equipment utilization practice, socio-demographic, work-related, environmental, and organizational factors. Data was analyzed using SPSS version 25. The logistic regression method was used to see factors associated with workers' protective equipment utilization. The strength of the association was calculated using an odds ratio at 95% confidence intervals.

**RESULTS:** Of the total workers, 216, 55.52% (48.33-57.78) workers utilize personal protective equipment in the factory. The study showed safety training [AOR (4.68, 95%CI (2.76-7.45)], availability of personal protective equipment [AOR = 4.86; 95%CI: 2.23-6.98], regular health and safety supervision [AOR = 2.751; 95%CI: 1.806-3.801], availability of safety guideline at workplace [AOR = 3.798; 95%CI: 1.248-6.173], having work experience 3 years and above [AOR = 1.64; 95%CI: 1.06-2.18], not using alcohol [AOR = 3.07; 95%CI: 2.11-4.76], and not smoking cigarette [AOR = 1.88; 95%CI: 1.55-3.11] were predictors of personal protective equipment utilization.

**CONCLUSION:** The level of personal protective equipment utilization among Phibela edible oil factory workers is 55.52%, which is moderate when compared to other studies done in developing countries. The presence of Safety training, availability of personal protective equipment, regular health and safety supervision, availability of guidelines at workplaces, having work experiences, not using alcohol, and cigarrete smoking were factors found to be a significant predictors of personal protective equipment utilization. As a result, close workplace supervision, safety training, and availing guidelines are the recommendations to be in place.

**KEYWORDS:** Utilization, personal protective equipment, factory worker, Ethiopia

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## Introduction

### *Background*

Employers, employees, governments, and the general public have long been concerned about how to protect workers against occupational diseases and injuries. This is because a safe workplace not only encourages the physical, mental, and social well-being of workers but also saves money on medical costs, work injuries, the loss of experienced personnel, and training costs of new workers, as well as costs related to workplace accidents.[1]

Edible oil production facilities in Ethiopia are crucial for food security, economic growth, and sustainable development. They contribute to the well-being of the population and offer investment prospects for entrepreneurs and investors.[2] Several companies in Ethiopia are involved in the manufacturing of edible oil. Some of the major players in the industry include: Savola Edible Oils Ethiopia Private Limited Company(PLC), Mulugeta Metaferia Oil Factory, Kaleb Edible Oil Share Company, Abyssinia Integrated Steel PLC, Tsehay Industry S.C, Belayneh Kinde Import & Export, Kifiya Edible Oil

Factory, Hamaressa Edible Oil Share Company, Gutema Firisa Construction PLC, and Mega Food Complex PLC.[2] The number of employees across all edible oil production facilities in Ethiopia varies from facility to facility. For example, Addis Modjo Edible Oil Complex Share Company has about 280 employees, whereas PhiBela oil factory owned by Belayneh Kinde Import & Export have total of 3562 workers who work in different sections of the factory.[3]

However, similar to other industrial operations, the manufacturing of edible oil entails significant risks to public health, safety, and the environment.[4] An accident that occurs in the industrial context, will pose a risk that harms people, property, and the environment. By an International Labor Organization (ILO) report, there are 317 million workplace accidents each year, and 6300 people die as a result of those accidents or illnesses. These incidents cost around 4% of the global GDP in economic terms.[5] In the Edible Oil Factory the capital-intensive nature of the technology and infrastructure required for oil extraction, refining, and packaging generates high obstacles to entry, incentivizing larger, more centralized operations, which are the leading source of accidents.[6] Wearing personal protection equipment (PPE) at work is one of the best strategies to prevent occupational injuries among workers. The utilization of PPE is a widely accepted regulatory necessity and an essential tactic for preventing occupational diseases and injuries.[7]

Personal Protective Equipment (PPE) is any tool, device, clothing, or piece of equipment that shields the user from health or safety concerns that could cause illness, injury, or even death to the user.[8] Different PPEs such as safety helmets, hard hats, face masks, gloves, eye protection, boots, ear plugs, high-visibility apparel, and safety footwear are used in preventing exposure to or impact on different body parts by chemicals, hot particles (a microscopic piece of radioactive material), biological agents, and radiation.[9]

PPE should be worn by employees to safeguard against work-related diseases, injuries, and fatalities.[10] Studies carried out all across the world indicate that workers use PPE in an inadequate, erroneous, incomplete, and inconsistent manner.[11-13]

Globally, 34% of occupational accidents were caused by loss of adherence to the use of PPE. Furthermore, improper utilization of PPE is attributed to 13% of work-related injuries.[14] In Ethiopia, workers' health and safety is governed by the Labour Proclamation No. 1156/2019. Some key provisions related to protecting workers' health in Ethiopian companies includes: Suitable Measures of Protection and Safety, Protective Equipment and Clothing, and Training and Instruction.[15] However, according to earlier studies, only about 5% to 10% of Ethiopian employees have access to occupational health services in their specific employment. As a result, nearly half (44.66%) of the employees have reported having work-related injuries in the country. However, having safety measures in place and wearing PPE appropriately and frequently can prevent more than 90% of these injuries.[16]

Different factors are identified as having correlation with non-utilization of PPEs in building construction work places in Ethiopia. These includes awareness and training, safety orientation, supervision, and availability of PPE materials.[7] However, there is a paucity of evidence regarding the magnitude of PPE utilization among edible oil factory employees and factory-specific factors are not identified so far in Ethiopia.

An edible oil factory is a labor-intensive and technologically complex industry, with workers potentially exposed to several chemical, dust, and mechanical hazards emanating from such industries, which we may mitigate based on extraction and refining. However, such industries are not given a great deal of attention, particularly in Ethiopia. As a result, the objective of this study was to assess PPE utilization and the variables affecting its use among employees of the PhiBela edible oil factory in Burie, Northwest, Ethiopia.

## Materials and Methods

### *Study area*

The study was carried out at the PhiBela oil factory in Burie, West Gojjam, Amhara Region, Northwest Ethiopia. The area is located at a distance of 411 km from Addis Ababa, the capital of Ethiopia, and 164 km from Bahir Dar, the regional capital of the Amhara. The factory produces edible oil and is one of the largest privately held businesses in the town of Burie. It has a total of 3562 workers who work in different sections of the factory, excluding those who work as administrative workers other than production (Figure 1).

### *Study design and period*

An institutional-based cross-sectional study was carried out between March and April 2022.

### *Study population*

All workers who are directly involved in the process of production in PhiBela edible oil factory were included until the required sample size was achieved. The factory workers who were selected as a study subjects were considered as a study population.

### *Inclusion criteria*

To be eligible to participate in the study, they had to be workers in the selected industry who draw salaries or wages and have been on the payroll for at least 6 months or more before the date of research. While those workers who were absent due to illness, and those who were on sick-leave during the study period were excluded from the study.

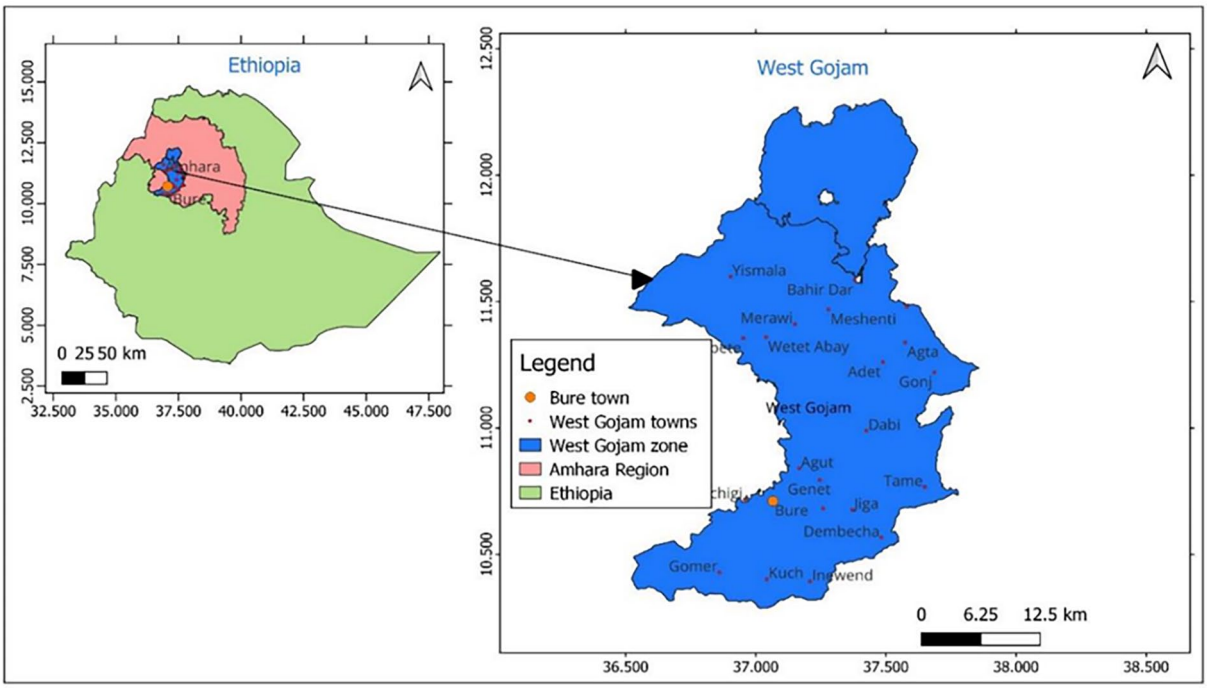


**Figure 1.** Study area map.

### *Sample size determination*

The required sample size for the study is determined using single population proportion formula according to the available literature taking the prevalence of PPE actual use as 41%.[17]

$$(n) = \frac{(Z - /2)^2 P(1-P)}{(d)^2}$$

$$(n) = \frac{(1.96)^2 0.41(1-0.41)}{(0.05)^2} = 372$$

Where, n = calculated sample size, z = standard normal deviate at 95%, Confidence Interval (CI) = 1.96, P = percentage of utilization of PPE (41%),[17] 1 – P = the complementary probability of *P* which is .59, and *d* is margin of error .05.

After a 10% non-respondent rate was considered (Ejeso et al, 2024 = Prevalence and Associated Factors of Work-Related Injury Among Municipal Solid Waste Collectors in Hawassa City, Southern Ethiopia: A Cross-Sectional Study) not to miss representative number of study subject, the final sample size was found to be 409 the factory workers.

### *Sampling technique*

Stratified sampling followed by simple random sampling techniques were used to select the study participants. The manufacturing units were stratified into 6 departments: operator, welder, loader, plumber, mechanic, and painter. Then, the total of 409 samples was proportionally allocated to each department. Finally, the participants were drawn from the factory's list of workers using simple random sampling.

### *Study variables*

Utilization of PPE was considered as a response or outcome variable in this study. Socio-demographic characteristics [Age, sex, religion, educational status, marital status, employment pattern, monthly income, work experience)], Behavioral related factors [Drinking alcohol, smoking cigarette, satisfaction with job, chewing chat], Individual factors [Knowledge about work hazards, knowledge about PPE], Work related factors [Work experience, work status, types of occupation, duration of work, availability of PPE, attend safety training, orientation given, safety supervision, work shift, and work rotation, good light, well ventilation] were considered as the independent variables in this study.

### *Data collection tool and procedure*

The socio-demographic, behavioral related, and work-related variables were collected through a pretested structured questionnaire developed by reviewing the literature[7,17-21] and following the COVID-19 global pandemic prevention guideline.[22] The questionnaire contains 4 main parts. Part I contains the sociodemographic condition of the respondents; and comprises a list of 8 items. Part II also contains the behavioral characteristics of the respondents; and it comprises 4 items, whereas Part III contains

individual characteristics of the respondents; and comprises 2 items. Then Part-IV also contains work-related conditions; which comprises 12 items. To maintain uniformity, the questionnaires were written in English and then translated into Amharic and returned to English by independent language specialists. To ensure the dependability and validity of the tool, a pre-test was conducted among 16 respondents from the nearby Grace Biscuit factory, found in Debre Markos town. The Cronbach's alpha value for the questionnaire was .73, which indicates that it is acceptable because it is greater than 0.60.[23] As a result, the reliability of the questionnaire in this study was determined to be acceptable. The data were collected by 4 Environmental Health professionals pre-trained for the purpose.

### *Data management and statistical analysis*

Data cleaning was done to make sure the data was accurate, comprehensive, consistent, and free of missing values and variables. It was coded manually, entered into Epi Data version 4.2.0.0, and exported to SPSS version 25 for analysis. Descriptive statistics were performed on numerical values (mean, standard deviation, frequencies, and proportion) to describe the study population with dependent and independent variables. Model fitness was also tested using the Hosmer-Lemeshow test ($P$-value = .61), and the value indicated that the model is a good fit ($P$-value > .05). A multi-collinearity among variables was checked by considering a variance inflation factor (VIF) and found no predictor variable with VIF greater than 10. Then, bi-variables and multi-variables logistic regression were computed to identify significantly associated determinant factors. Variables that appear to be associated with $P < .25$ in the bivariate binary logistic regression analysis were considered in the multivariable analysis. Adjusted odds ratio (AOR) and 95% confidence interval (CI) are estimated. Variables with $P < .05$ were considered statistically significant predictor variables.

### *Operational definitions*

*Utilization of PPE.* Workers should wear all essential worker-specific clothing or equipment to protect themselves from health and safety concerns at work.[24] Workers were classified as those who used PPE when they were observed wearing all the PPE that was necessary to be worn during work in a particular working section. The nature of the dependent variable workers use PPE all the time while working with yes/no questions, with ratings for yes = 1 and no = 0. The necessarily worn PPE were: (1) a respirator, gloves, eye protector, boot shoes, overall, ear plugs, and mask at the operator section, (2) a respirator, gloves, eye protector, boot shoes, ear plugs and overall at welder section, (3) respirator, gloves, mask, ear plugs, boot shoes and overall at loader section, (4) respirator, gloves, boot shoes, eye protector, overall, reflector, mask and helmet at plumber section, (5) gloves, boot shoes, mask and overall at mechanic section, and (6) respirator, gloves, masks, ear plugs, boot shoes and overall at painter section were provided in self-administered form.

## Results

### *Socio-demographic characteristics of the respondents*

This study included 409 factory workers, and the response rate was 95.1% (389). The participants were found to be mostly male, with 261 (67.09%). The majority of respondents were between the ages of 25 and 31 which account for 214 (55.01%). The respondents mean age was 28.60 years (SD = 5.90 years). The minimum and maximum age of the respondents were 18 and 55 years, respectively. Three hundred six (92.80%) study participants were identified as followers of the Orthodox Christian religion. In terms of marital status, 199 respondents (51.08%) were single. At least 1 out of 4 respondents 102 (26.22%), had completed secondary education. Only quarter of the respondents (24.01%) have more than 3 years of work experience. The respondents mean monthly income was 6377.51 Ethiopian Birr (ETB; SD = 1943.03). The minimum and maximum monthly income of the respondents were 1500 and 9500 ETB, respectively (Table 1).

### *Utilization of PPE*

Two hundred sixteen (55.52%) of the participants were using all the job-demand PPE during working time. On the other hand, 173 (44.48%) of the workers did not use all the necessary PPE during work. The top 4 reasons for not using PPE were non-availability, not being comfortable to use, wanting to save time, and personal negligence (Figure 2).

All workers have 100% adherence to safety shoe utilization unlike for the other type of PPEs. The study revealed that only 40 (10.28%) of the 166 workers who needed to use earplugs did so. The level of worker utilization for each PPEs depicted (Table 2).

### *Behavioral characteristics of respondents*

Of the total participants, 13 (3.35%), 11 (2.82%), and 170 (43.70%) are addicted to smoking, chewing khat, and drinking alcohol, respectively. Additionally, 369 (94.86%) of the respondents said they were happy with their work (Table 3).

### *Environmental and organizational conditions*

Almost all of the respondents (98%) responded that the factory provides PPEs. The majority of the respondents, 356 (91.52%), perceived their work to be risky. Almost 85% of the respondents took safety training in connection with new employment,

**Table 1.** Socio-demography characteristics of the respondent among PhiBella oil factory workers, Burie, West Gojjam, Ethiopia, 2022 (n = 389).

| VARIABLE | CATEGORY | FREQUENCY | PERCENT (%) |
|---|---|---|---|
| Gender | Male | 261 | 67.09 |
| | Female | 128 | 32.91 |
| Age (y) | 18-24 | 86 | 22.10 |
| | 25-31 | 214 | 55.01 |
| | 32-38 | 65 | 16.70 |
| | 39-45 | 19 | 4.88 |
| | >45 | 5 | 1.28 |
| Religion | Orthodox | 361 | 92.80 |
| | Muslim | 18 | 4.62 |
| | Protestant | 10 | 2.57 |
| Marital status | Married | 174 | 44.73 |
| | Single | 199 | 51.08 |
| | Divorced | 8 | 2.05 |
| | Widowed | 3 | 0.77 |
| | Separated | 5 | 1.28 |
| Educational status | Unable to read and write | 3 | 0.77 |
| | Read and write | 20 | 5.14 |
| | Primary school (1-8) | 86 | 22.20 |
| | Secondary school (9-12) | 102 | 26.22 |
| | Technical and vocational | 96 | 24.67 |
| | Degree or higher | 82 | 21.07 |
| Employment pattern | Permanent | 375 | 96.40 |
| | Temporary | 14 | 3.59 |
| Monthly income (ETB) | 1500-3400 | 17 | 4.37 |
| | 3500-5400 | 125 | 32.13 |
| | 5500-7400 | 121 | 31.10 |
| | 7500-9400 | 90 | 23.13 |
| | ⩾9500 | 36 | 9.25 |
| Type of work | Mechanic | 93 | 23.90 |
| | Welder | 67 | 17.22 |
| | Electrician | 24 | 6.16 |
| | Painter | 16 | 4.11 |
| | Plumber | 10 | 2.57 |
| | Carpenter | 24 | 6.16 |
| | Machinist | 29 | 7.45 |
| | Operator | 56 | 14.39 |
| | Loader/Off loader | 52 | 13.36 |
| | Cleaner | 18 | 4.62 |
| Work experience (y) | <1 | 136 | 36.13 |
| | 1-3 | 158 | 40.21 |
| | >3 | 95 | 24.01 |

equipment, or work process. The detail on environmental and organizational conditions is depicted below (Table 4).

### *Factors that affect the utilization of PPE*

The result of the multivariable logistic regression analysis showed that the utilization of PPE among workers who have taken safety training is 4.68 times higher than workers who have not taken the training [AOR = 4.68; 95%CI: 2.76-7.45]. Similarly, the utilization among workers who have access to and availability of PPE is 4.86 times higher than their counterparts [AOR = 4.86; 95%CI: 2.23-6.98). The presence of health and safety supervision [AOR = 2.75; 95%CI: 1.81-3.80] and safety guidelines for the workers [AOR = 3.80; 95%CI: 1.25-6.17] were also among the factors significantly associated with PPE utilization. The odds of PPE utilization among workers having work experience of more than 3 years was approximately 2 times higher as compared to those workers who had work experience of less than 1 year [AOR = 1.64; 95%CI: 1.06-2.18]. Furthermore, the odds of PPE utilization among alcohol non user workers was 3 times higher as compared to those who used alcohol [AOR = 3.07; 95%CI: 2.11-4.76]. Likewise, the odds of PPE utilization among cigarette non-smoker workers was approximately 2 times higher as compared to those who smoked cigarette [AOR = 1.88; 95%CI: 1.55-3.11] (Table 5).

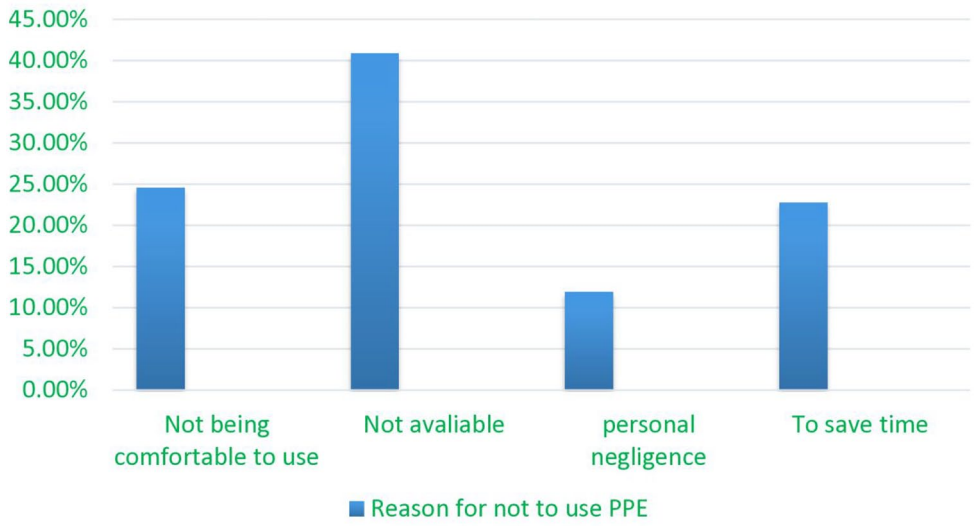


**Figure 2.** Reasons of the respondents for not to utilize the necessary PPE during work among PhiBella oil factory workers, Burie, West Gojjam, Ethiopia, 2022.

**Table 2.** Type and level of PPE utilization by PhiBella oil factory workers, Burie, West Gojjam, Ethiopia, 2022 (n = 389).

| TYPE OF PPE | USE | FREQUENCY | PERCENT (%) |
|---|---|---|---|
| Glove | Yes | 371 | 95.37 |
| | No | 18 | 4.63 |
| Ear plug | Yes | 40 | 10.28 |
| | No | 349 | 89.71 |
| Mask | Yes | 315 | 80.97 |
| | No | 74 | 19.03 |
| Helmet | Yes | 281 | 72.23 |
| | No | 108 | 27.76 |
| Overall | Yes | 349 | 89.71 |
| | No | 40 | 10.28 |
| Goggles | Yes | 44 | 19.73 |
| | No | 179 | 80.26 |
| | Subtotal | 223 | 100.00 |
| Boots/shoes | Yes | 297 | 100.00 |
| | No | 0 | 0.00 |
| Face shield/ Safety glass | Yes | 21 | 20.19 |
| | No | 83 | 79.91 |
| | Subtotal | 104 | 100.00 |
| Reflective vest | Yes | 32 | 20.64 |
| | No | 123 | 79.36 |
| | Subtotal | 155 | 100.00 |

**Table 3.** Behavioral characteristics of PhiBella oil factory workers, Burie, West Gojjam, Ethiopia, 2022 (n = 389).

| CATEGORY | RESPONSE | FREQUENCY | PERCENT (%) |
|---|---|---|---|
| Smoke cigarette | No | 376 | 96.65 |
| | Yes | 13 | 3.35 |
| Alcohol use | No | 219 | 56.30 |
| | Yes | 170 | 43.70 |
| Chew khat? | No | 378 | 97.17 |
| | Yes | 11 | 2.82 |
| Job satisfaction | No | 20 | 5.14 |
| | Yes | 369 | 94.86 |

## Discussion

In this study, the magnitude of PPE utilization among Phibela edible oil factory workers was 55.52%. This finding is almost comparable with studies finding from the Kombolcha textile factory, Ethiopia, Adwa textile factory, Ethiopia, and Kampala, Uganda which indicated that 58.2%, 54.0%, and 50.4% of the workers had good PPE utilization, respectively.[17,25,26] This finding is much lower than a study done in Addis Ababa (78.2%), Hawassa Town (82.4%), Zambia (77.33%), and Thailand (70.1%).[21,27,28] While the result is higher than a study done in Addis Ababa (43.6%), industrial workers in Iran (41.7%), Debre Berhan town (41.7%), Debre Berhan (35.4%), and small-scale garment enterprises in Botswana (9.3%).[18,24,29,30] This disparity could be attributed to the differences in study populations, workplace conditions, and employees' level of awareness about hazard control and disease prevention. This finding implies that those workers who are

**Table 4.** Working environment and organization conditions in Phibela edible oil Factory, Burie, West Gojjam, Ethiopia, 2022 (n=389).

| CATEGORY | RESPONSE | FREQUENCY | PERCENT (%) |
|---|---|---|---|
| Training on any type of PPE issues when you were first engaged in this job? | Yes | 69 | 17.73 |
| | No | 321 | 82.26 |
| On-job training on any type of PPE issues? | No | 62 | 15.93 |
| | Yes | 323 | 84.07 |
| The perceived workplace is a risk | No | 33 | 8.49 |
| | Yes | 356 | 91.52 |
| May be exposed to injuries or harmful substances at work | No | 130 | 33.41 |
| | Yes | 259 | 66.59 |
| Fellow workers use PPEs when they are working | No | 9 | 2.31 |
| | Yes | 380 | 97.69 |
| Co-workers encourage you to use PPEs | No | 87 | 22.36 |
| | Yes | 302 | 77.63 |
| Work-related injury | No | 366 | 94.08 |
| | Yes | 22 | 5.92 |
| Regular health and safety supervision | Yes | 241 | 36.24 |
| | No | 148 | 19.28 |
| Safety training in connection with new employment, equipment, or work Process | No | 61 | 15.68 |
| | Yes | 328 | 84.32 |
| Safety orientation before the start of the job? | No | 146 | 37.53 |
| | Yes | 243 | 62.47 |
| Safety guidelines in the workplace | No | 205 | 52.69 |
| | Yes | 184 | 47.30 |
| Work shift | No | 41 | 10.53 |
| | Yes | 348 | 89.47 |
| Work rotation? | No | 346 | 88.94 |
| | Yes | 43 | 11.06 |

not using PPE are prone to work related injuries. Workers health and safety should be protected and guaranteed.[15]

In this study, the major reasons for not using PPE at work were unavailability of PPE in place, discomfort to use, time taking, and being negligent. This is supported by the study done in Addis Ababa and Debre Berhan, which showed a lack of PPE as the reason for not using PPE in 74.5% and 86.9% of cases, respectively.[7,20] It is also in line with the study conducted in Nigeria,[31] in which feeling discomfort to use PPE was the major reason.

This study pointed out as taking safety training, availability of PPE, regular health and safety supervision, and availability of safety guidelines were significantly associated predictors factors with the level of PPE utilization. In this regard, workers who have taken safety training were 4.68 times more likely to utilize PPE. This was supported by previous studies.[7,17,32-34] Similarly, those who had not been trained on PPE utilization were less likely to utilize PPE in line with the previous studies.[34,35] This might be due to the reason training the workers ensures workers remain enforced and motivated to follow the safety instructions by creating better cooperation between workers, managers, and the safety committee of the factory. Furthermore, training workers on safety and proper PPE use promotes and has significant benefits in the proper utilization of PPE, which is intended to reduce the risk of worksite injuries.

**Table 5.** Factors associated with the utilization of PPE among Workers in Phibella Edible Oil factory, Burie, West Gojjam, Ethiopia, 2022 (n = 389).

| VARIABLE | CATEGORY | PPE UTILIZATION | | COR (95%CI) | AOR (95%CI) |
|---|---|---|---|---|---|
| | | YES | NO | | |
| Term of employment | Permanent | 209 | 166 | 1 | 1 |
| | Temporary | 7 | 7 | 0.79 (0.65-0.96) | 0.81 (0.71-0.95) |
| Safety training | Yes | 99 | 32 | 5.42 (3.12-8.21) | 4.68 (2.76-7.45) |
| | No | 117 | 121 | 1 | 1 |
| Work experience | <1 y | 69 | 67 | 1 | |
| | 1-3 y | 86 | 72 | 1.15 (1.02-1.22) | 1.07 (1.01-2.56) |
| | >3 y | 61 | 34 | 1.74 (1.45-2.43) | 1.64 (1.06-2.18) |
| PPE available | Yes | 166 | 64 | 5.65 (2.33-8.79) | 4.86 (2.23-6.98) |
| | No | 50 | 109 | 1 | 1 |
| Alcohol use | Yes | 96 | 123 | 1 | 1 |
| | No | 120 | 50 | 3.07 (2.11-4.76) | 3.01 (2.06-4.32) |
| Smoke cigarette | Yes | 5 | 8 | 1 | |
| | No | 211 | 166 | 2.03 (1.67-3.88) | 1.88 (1.55-3.11) |
| Health and safety supervision | Yes | 141 | 100 | 1.37 (1.12-3.67) | 2.75 (1.81-3.80) |
| | No | 75 | 73 | 1 | 1 |
| Safety Guidelines in the workplace | Yes | 136 | 48 | 4.42 (2.88-6.97) | 3.80 (1.25-6.17) |
| | No | 80 | 125 | 1 | 1 |

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; COR, crude odds ratio. Significant at a *P*-value less than .05.

In this study, workers in PPE-equipped workplaces within the factory were 4.86 times more likely to utilize PPE than those in non-equipped or limited-access working sites. This is similar to that of previous studies done in small-scale garment enterprises in Gaborone, Botswana, and among textile mill workers in Dera Ismail Khan.[24,36] Cognizant of this fact, safety administration programs should consider availing of all the necessary PPE on regular bases to promote health and safety in the workplace.

Regarding health and safety supervision, the odds of PPE utilization among workers who have close workplace supervision were about 2.75 times higher as compared to their counterparts. This finding is in line with studies conducted in Addis Ababa and Debre Berhan, Ethiopia on building construction and Large Scale Factory Workers' PPE utilization respectively.[7,20] This implies that close supervision of workplaces condition assists workplace hazard identification and compliance monitors processes.

The level of PPE utilization was also significantly associated with the presence of health and safety guidelines in which the odds of PPE utilization among workers who work in working areas where health and safety guidelines are in place were 3.80 times higher as compared with those without such guidelines. This evidence is in line with a study done in Debre Berhan, Ethiopia on PPE utilization and associated factors among Large Scale Factory Workers.[20] The presence of health and safety guidelines might promote and dictates the workers to use PPE appropriately following the guidelines' processes.

Work experience is another factor significantly associated with the utilization of PPE among factory workers. The possible reason for this might be taking training and experience sharing as the workers get more experience.

Furthermore, the odds of PPE utilization among alcohol non-users, and cigarette nonsmokers was higher as compared to their counterparts. This might be due to the effect of these substance use on users' perception and make them to be negligence at risk of work related injuries.

## Limitations of the Study

A causal relationship between the predictor and outcome variables could not be determined because of the cross-sectional nature of the study. In self-reported studies, workers may express socially acceptable responses rather than their real day-to-day practices.

## Conclusion

The level of utilization of PPE among Phibela edible oil factory workers is 55.52%, which is moderate as compared with other studies done in developing countries. However, this does not mean that there will be no need for further strengthening of the safety programs, as a significant proportion (almost half) of the workers still do not use all the necessary PPE during work. The PPE utilization of workers in the Phibela edible oil factory was significantly associated with the safety training, availability of PPE, presence of regular health and safety supervision, presence of safety guidelines, having work experience, not using alcohol, and not smoking cigarettes. So factory management and workers should intervene to increase the availability of PPE and safety guidelines in place, strengthening supervision, providing training for workers, and advise them not to use alcohol and smoke cigarette.

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## Author Contributions

AT: developed the study design literature review, quality assessment, data extraction, statistical analysis, and interpretation of the data. AT, ET, GY, LK, TA, MA, TKZ, and AAA developed drafts of the manuscript. All authors approved the final manuscript.

## Availability of Data and Material

The datasets analyzed during the current study are available from the corresponding author upon reasonable request.

## Consent for Publication

Not applicable

## Ethical Consideration

The College of Medicine and Health Sciences at Debre Markos University's Research and Ethics committee provided its ethical approval and clearance. To obtain permission, a formal letter of support was provided to the PhiBela edible oil factory. After obtaining clearance from the Phibila edible oil factory Managerial office, data collection began by contacting study participants. Participants' involvement in the study shall be voluntary, and those who are unwilling to participate in the study or who wish to discontinue their participation at any stage would be informed to do so without any restrictions. Study participants were informed of the purpose of the study; confidentiality will also be maintained at all levels of the study. In addition, an informed verbal consent was taken from each participant.

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