



Knowledge, Attitudes and Factors associated with Personal Protective Equipment Use Among Coffee Processing Factory Workers in Kibinge Sub-County, Bukomansimbi District, Uganda: A Cross-Sectional Study.

Ivan Ssebandeke*, Aloysius Ssenyonjo

Department of Health Policy Planning and Management, Makerere University School of Public Health, Kampala, Uganda.

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Abstract

Background:

Workers in coffee processing factories are routinely exposed to occupational hazards, including dust, noise, machinery, and chemical agents. Personal Protective Equipment (PPE) use is a critical last-resort control measure in mitigating occupational injuries and exposures, yet its uptake in low-income industrial settings remains poorly documented. This study assessed the knowledge, attitudes, and practices (KAP) concerning PPE use among coffee processing factory workers in Kibinge Sub-County, Bukomansimbi District, Uganda, and identified factors associated with good PPE use practices.

Methods:

A cross-sectional study design with quantitative data collection methods was employed. A total of 158 workers were recruited from 15 coffee processing factories using proportionate and simple random sampling. Data were collected using a structured, interviewer-administered questionnaire embedded in Kobo Collect and analysed using STATA 14, with univariate, bivariate, and multivariate analyses performed.

Results:

The majority of participants (72.2%) were male, with a mean age of 30.97 years (SD 8.73). Most workers (66.5%) demonstrated good knowledge of PPE, while 51.9% had a positive attitude towards its use. Good PPE practices were reported by 55.1% of participants. In multivariate analysis, four factors were independently associated with good PPE practices: good knowledge (AOR=3.91; 95% CI: 2.36–9.87; $p<0.001$), positive attitude (AOR=0.27 for negative attitude; 95% CI: 0.12–0.60; $p=0.002$), temporary employment status (AOR=0.38; 95% CI: 0.17–0.85; $p=0.018$), and tertiary/university education (AOR=7.83; 95% CI: 1.09–56.14; $p=0.040$). The majority of workers (70.3%) were responsible for providing their own PPE, and 60.8% had never received any PPE training.

Conclusion:

While knowledge and attitudes were generally favourable, PPE practices remained suboptimal. The study underscores the need for employer-led PPE provision, structured training, and stronger enforcement of Uganda's Occupational Health and Safety Act (2006) in agricultural processing industries.

Keywords: *personal protective equipment; occupational safety; coffee processing; Knowledge, Attitudes and Practices (KAP) study; Uganda; Sub-Saharan Africa.*

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Corresponding author: Ivan Ssebandeke

Email: ssebandekeivan8@gmail.com

<https://orcid.org/0009-0008-8282-1270>

Department of Health Policy Planning and Management, Makerere University School of Public Health, Kampala, Uganda

1. Introduction

Occupational safety and health (OSH) remains a critical public health priority globally. According to the most recent estimates by the International Labour Organization (ILO), nearly three million workers die every year due to work-

related accidents and diseases, a figure that has increased by more than five per cent compared to 2015 (1). In addition to these fatalities, an estimated 395 million workers worldwide sustained non-fatal work injuries in 2019, underscoring the enormous and persistent burden of occupational morbidity.



(2). Work-related diseases account for the overwhelming majority of these deaths, with cardiovascular diseases, malignant neoplasms, and respiratory conditions together responsible for more than three-quarters of total work-related mortality. (2). The economic toll is equally staggering: a 2024 analysis estimated that occupational injuries and diseases result in losses equivalent to approximately 5.8% of global GDP, placing OSH at the intersection of public health, social equity, and economic development. (3).

This burden falls disproportionately on low- and middle-income countries (LMICs). Available statistics indicate approximately 21 fatalities per 100,000 workers and 16,000 accidents per 100,000 workers in sub-Saharan Africa, rates substantially higher than those recorded in high-income settings. (4). These disparities reflect compounding structural vulnerabilities, including weaker regulatory frameworks, inadequate workplace inspections, lower levels of worker education and health literacy, and limited access to appropriate protective equipment. In many African countries, the agricultural and agro-processing sectors, which employ the largest share of the workforce, are especially affected by these gaps, yet they remain among the least studied in terms of occupational safety outcomes.

Coffee processing represents a significant occupational sector in Uganda, particularly in the Greater Masaka region, where Robusta coffee cultivation and processing are a primary livelihood. Uganda is one of Africa's leading coffee exporters, and the agro-processing value chain supports the livelihoods of millions of smallholder farmers and factory workers. Workers in these factories are exposed to a range of hazards, including occupational dust, noise from processing machinery, chemical exposures, and heat stress. Research conducted in East Africa has consistently demonstrated that primary coffee processing generates high concentrations of organic dust and endotoxin in worker breathing zones, with dust levels in some Ethiopian factories reaching geometric mean concentrations as high as 12 mg/m³, far exceeding internationally recommended occupational exposure limits. (5). Dry pre-processing, the predominant method in the study area, is associated with higher endotoxin and dust exposure than wet processing, significantly increasing the risk of acute and chronic respiratory disease among workers. (5, 6).

A 2022 editorial in *Frontiers in Public Health*, reviewing the body of evidence on coffee worker health across East Africa, highlighted that inhalational hazards, including organic dust, endotoxin, and green coffee bean allergen, remain incompletely controlled in primary processing settings, and that respiratory morbidity continues to be disproportionately

high in this workforce. (6). Beyond respiratory hazards, workers face noise-induced hearing loss from hulling and sorting machinery, musculoskeletal injuries from manual handling, and laceration and crush injuries from processing equipment. Despite this multifaceted hazard profile, documented use of personal protective equipment (PPE) among coffee processing workers in Uganda is sparse.

The Uganda Occupational Health and Safety (OHS) Act (2006), most recently amended in 2023, mandates employers to provide appropriate PPE to all workers exposed to occupational hazards, as well as to ensure adequate information, training, and supervision related to workplace safety (7). Despite this clear legal framework, compliance and enforcement in small- and medium-scale industrial settings remain inconsistent. A 2022 audit by Uganda's Occupational Safety and Health Department (OSHD) found that a substantial proportion of inspected workplaces failed to meet minimum safety standards, with non-provision of PPE among the most commonly cited violations (8). The gap between policy mandate and ground-level practice is especially pronounced in peri-urban and rural agro-processing industries, where labour inspections are infrequent, and workers have limited recourse when employers fail to comply.

PPE, while positioned at the bottom of the occupational hazard control hierarchy (below elimination, substitution, engineering controls, and administrative measures), is critical in settings where higher-order controls are insufficient or infeasible (9). In the context of coffee processing in Uganda, where engineering controls such as local exhaust ventilation are largely absent, and dust suppression measures are minimal, PPE represents the primary available barrier between workers and occupational exposures. Its appropriate and consistent use is therefore of direct clinical and public health significance.

Knowledge, Attitude, and Practice (KAP) surveys are a well-established epidemiological method used to identify gaps and barriers related to a specific health behaviour within a defined population. (10). The KAP framework recognises that knowledge acquisition is a necessary but not sufficient condition for behaviour change; attitudes and perceptions serve as mediating factors that translate knowledge into practice. This three-level conceptualisation is particularly relevant in occupational health contexts, where workers may possess adequate knowledge of hazards and protective measures yet fail to translate this into consistent protective behaviour due to attitudinal barriers, structural constraints, or organisational factors.

Several KAP studies on PPE use have been conducted in similar African occupational settings, including welders in



Uganda. (11), textile workers in Ethiopia (12), and construction workers across sub-Saharan Africa, but published evidence from the coffee processing sector in Uganda was absent. Given the sector's economic importance and the documented severity of occupational hazards within it, this study aimed to address that gap by assessing KAP on PPE use among workers in Kibinge Sub-County, Bukomansimbi District, and identifying factors independently associated with PPE practices.

2. Methods

2.1 Study Design and Setting

A cross-sectional study using quantitative methods was conducted between January and April 2024 in Kibinge Sub County, Bukomansimbi District, Central Region of Uganda (coordinates: 0.2710°S, 31.6511°E). The sub-county has over 20 coffee processing factories and largely depends on coffee farming as its primary economic activity.

2.2 Study Population and Sampling

The study population comprised workers in coffee processing factories in Kibinge Sub-County. The sample size was calculated using the Kish-Leslie (1965) formula at 95% confidence interval, 10% precision, and 50% proportion (given no prior study), yielding a minimum of 96, adjusted to 158 after design effect (1.5) and non-response (10%) corrections.

Purposively, Kibinge Sub-County in Bukomansimbi South Constituency was selected since it has a large number of coffee processing factories, employing a greater population of workers. Fifteen coffee processing factories were selected by convenience sampling based on accessibility. Within each factory, workers were selected proportionally by dividing the number of workers employed in each coffee processing factory by the total number of workers in the coffee processing factories, multiplied by the sample size, which was 158, and simple random sampling was applied to the coffee factory workers who had been selected as eligible to participate in the study, using the lottery method. Workers employed for at least six months were eligible; administrative staff and those too ill to participate were excluded.

2.3 Data Collection

A structured questionnaire, pretested among 10 workers in Masaka City, was translated into Luganda and administered by trained research assistants using Kobo Collect. The questionnaire covered sociodemographic characteristics, history of workplace injury or illness, knowledge of PPE (4

items), attitudes towards PPE (6 Likert-scale items), and PPE practices (8 items).

2.4 Measurement of Outcome Variables

Knowledge was scored on a 4-point composite scale; participants scoring above the mean (2.35) were classified as having 'good knowledge'. Attitude was scored on a 30-point composite scale; participants scoring 13 or above were classified as having a 'positive attitude'. PPE practice was scored on an 8-point composite scale; participants scoring 5 or above were classified as having 'good PPE practice'. These classification methods follow precedents established by similar studies in Uganda (11).

2.5 Data Analysis

Quantitative data were exported from Kobo Collect to STATA 14 for analysis. Descriptive statistics were generated for all variables. Multivariate logistic regression analysis using Adjusted odds ratios (AOR) with 95% confidence intervals was performed to identify factors associated with good PPE practice. Statistical significance was set at $p < 0.05$.

2.6 Minimisation of Bias

Several measures were taken to minimise potential sources of bias. Selection bias was addressed through proportionate allocation of the sample across the 15 factories, followed by simple random (lottery) selection of eligible workers within each factory, so that participants were not purposively chosen. Information bias, including recall and social desirability bias, was minimised by pretesting the questionnaire among 10 workers in Masaka City prior to data collection, by training research assistants on standardised, non-leading administration of the tool, and by administering the questionnaire in Luganda to improve respondent comprehension. Interviewer bias was reduced by using a structured, closed-ended questionnaire embedded in Kobo Collect, which limited variation in how questions were posed and recorded. Data entry and transcription errors were minimised through electronic data capture with built-in skip patterns and range checks, reducing the potential for measurement error.

2.7 Ethical Considerations

Permission to conduct the study was obtained from Makerere University School of Public Health as part of the Bachelor's Programme of Environmental Health (#SPH-2024-3-28) on 28th March 2024. This letter was presented to the public health department of Kibinge sub-county, as

well as to the coffee processing factory administrations, for their consent to conduct the study. Furthermore, written informed consent was obtained from all participants. Confidentiality was maintained by omitting all identifying information from data records. Participation was voluntary, and participants could withdraw at any stage.

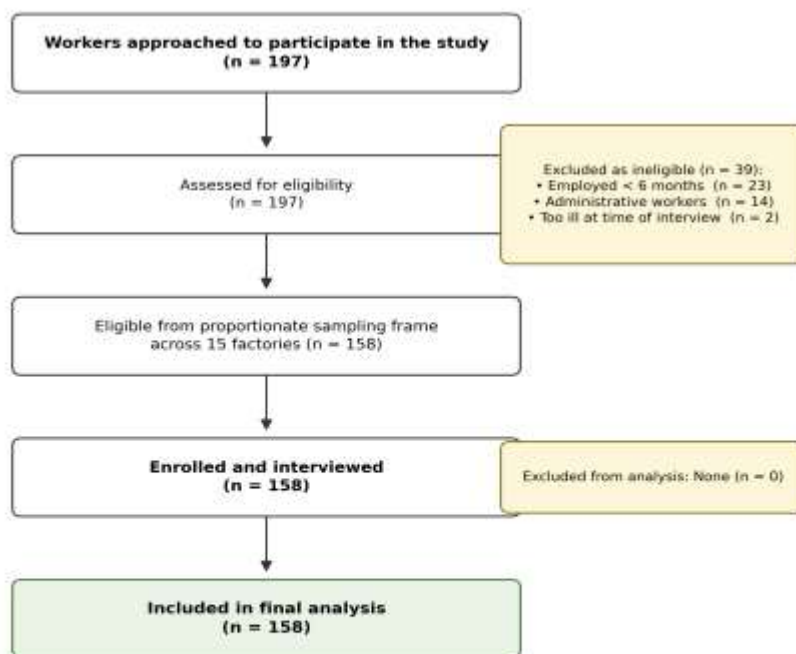
3. Results

3.1 Participation in the study

A total of 197 workers across the 15 selected factories were approached to participate in the study. Of these, 39 were

determined ineligible: 23 had been employed for less than six months, 14 were administrative staff, and 2 were too ill to participate at the time of the interview. This left 158 workers who were eligible from the proportionate sampling frame, all of whom were enrolled and interviewed. No records were excluded at the analysis stage, so all 158 participants were retained in the final analysis, giving a response and completion rate of 100% among eligible workers. The flow of participants through the study is presented in Figure 1.

Figure 1: Participant flow through the study



3.2 Sociodemographic Characteristics

A total of 158 workers participated in the study. The majority (72.2%) were male, with a mean age of 30.97 years (SD 8.73, range 17–55). Most participants had attained secondary education (60.8%). About half (51.3%) were

permanent employees, and 67.7% had a history of at least one work-related injury or illness. The most frequently reported injuries were breathing problems (36.1%), falls (29.7%), hearing defects (29.7%), and cuts or wounds (24.1%). Sociodemographic characteristics are summarised in Table 1.



Table 1: Sociodemographic characteristics of coffee processing factory workers, Kibinge Sub County, Uganda (n=158)

Variable	Category	n (%)	Total
Sex	Male	114 (72.2)	158
	Female	44 (27.8)	
Age (years)	17–27	66 (41.8)	158
	28–38	55 (34.8)	
	≥39	37 (23.4)	
	Mean (SD)	30.97 (8.73)	
Education level	Primary and below	46 (29.1)	158
	Secondary	96 (60.8)	
	Tertiary/University	16 (10.1)	
Employment status	Permanent	81 (51.3)	158
	Temporary	54 (34.2)	
	Contract	23 (14.5)	
History of past injury/illness	Yes	107 (67.7)	158

3.3 Knowledge About PPE

Most workers (83.5%) reported having heard about PPE. The most commonly recognised PPE types were masks (76.6%), gloves (69.9%), protective clothing (58.2%), and helmets (57.0%). About 70.3% of participants believed it

was important to wear PPE, and 79.3% cited protection against workplace hazards as the reason. However, only 12.0% were aware of any PPE-related policies or guidelines. Based on the composite score, 66.5% of participants had good knowledge of PPE (Table 2).

Table 2: Knowledge about PPE among coffee processing factory workers (n=158)

Variable	Yes/Good n (%)	No/Poor n (%)
Ever heard about PPE	132 (83.5)	26 (16.5)
Believes it is important to wear PPE	111 (70.3)	47 (29.7)
PPE protects workers from injuries/exposures	111 (70.3)	47 (29.7)
Aware of any PPE policies or guidelines	19 (12.0)	139 (88.0)
Overall knowledge level (composite)	Good: 105 (66.5%)	Poor: 53 (33.5%)



3.4 Attitudes Towards PPE Use

Over two-thirds of workers (70.9%) agreed or strongly agreed that coffee factory work is hazardous and requires PPE. A majority (74.1%) believed PPE use should be compulsory, and 79.1% believed workers should wear PPE

even without supervision. Only 38.6% viewed PPE as too expensive relative to its benefits. Three-quarters of workers (75.3%) expressed willingness to attend free employer-provided PPE training. Overall, 51.9% had a positive attitude towards PPE use (Table 3).

Table 3: Attitudes towards PPE use among coffee processing factory workers (n=158)

Attitude Statement	Agree/Strongly Agree n (%)	Disagree/Strongly Disagree n (%)	Neither n (%)
Coffee factory work is hazardous and requires PPE	112 (70.9)	17 (10.8)	29 (18.4)
Workers are exposed to hazards without PPE	114 (72.2)	18 (11.4)	26 (16.5)
PPE use should be compulsory for all workers	117 (74.1)	9 (5.7)	32 (20.3)
Workers without PPE are at risk of injury/illness	109 (69.0)	13 (8.2)	36 (22.8)
Workers should wear PPE even without supervision	125 (79.1)	15 (9.5)	18 (11.4)
Willing to attend free PPE training	119 (75.3)	39 (24.7)	—
Overall attitude (composite)	Positive: 82 (51.9%)	Negative: 76 (48.1%)	

3.5 PPE Use Practices

Most workers (69.6%) reported using at least one PPE item during work. The most commonly used PPE were masks (45.6%), gloves (34.2%), protective clothing (32.9%), and helmets (31.6%). Notably, 70.3% of workers reported that

they were personally responsible for providing their own PPE rather than receiving it from management. Only 39.2% reported receiving training on PPE use. A composite practice score classified 55.1% of workers as having good PPE practices (Table 4).

Table 4: PPE use practices among coffee processing factory workers (n=158)

Variable	n (%)	Notes
Uses at least one PPE at work	110 (69.6)	
Most common PPE used: Mask	72 (45.6)	Multiple response
Most common PPE used: Gloves	54 (34.2)	Multiple response
Most common PPE used: Protective clothing	52 (32.9)	Multiple response
PPE provided by workers themselves (not the employer)	111 (70.3)	
Received training on PPE use	62 (39.2)	
Overall PPE practice (composite)	Good: 87 (55.1%)	Poor: 71 (44.9%)

3.6 Factors Associated with Good PPE Practice

Both bivariate and multivariate logistic regression analyses were conducted to identify factors associated with good PPE practice. In the multivariate model, adjusting for sex, age, marital status, education level, daily working hours, employment status, history of injury, knowledge level, and attitude

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Table 5(a): Factors associated with good PPE use practices — bivariate and multivariate logistic regression analysis

Variable	Good PPE Yes n (%)	Good PPE No n (%)	COR (95% CI)	p-value	AOR (95% CI)	p-value
Sex						
Male (ref)	67 (58.8)	47 (41.2)	1.00 [Ref]	—	1.00 [Ref]	—
Female	20 (45.5)	24 (54.5)	0.58 (0.29–1.18)	0.133	0.61 (0.28–1.33)	0.213
Age group						
17–27 years (ref)	33 (50.0)	33 (50.0)	1.00 [Ref]	—	1.00 [Ref]	—
28–38 years	33 (60.0)	22 (40.0)	1.50 (0.73–3.09)	0.272	1.38 (0.63–3.02)	0.418
≥39 years	21 (56.8)	16 (43.2)	1.31 (0.58–2.95)	0.510	1.17 (0.49–2.81)	0.721
Marital status						
Single (ref)	41 (52.6)	37 (47.4)	1.00 [Ref]	—	1.00 [Ref]	—
Married	34 (54.0)	29 (46.0)	1.10 (0.54–2.06)	0.868	0.96 (0.44–2.09)	0.921
Divorced	8 (66.7)	4 (33.3)	1.80 (0.50–6.50)	0.366	1.44 (0.36–5.76)	0.601
Widowed	4 (80.0)	1 (20.0)	3.61 (0.39–33.77)	0.260	2.98 (0.27–32.8)	0.371
Education level						
Not educated (ref)	3 (27.3)	8 (72.7)	1.00 [Ref]	—	1.00 [Ref]	—
Primary level	21 (60.0)	14 (40.0)	4.00 (0.90–17.74)	0.068	3.21 (0.64–16.08)	0.156



Secondary level	50 (52.1)	46 (47.9)	2.90 (0.72– 11.59)	0.132	2.44 (0.54– 11.03)	0.245
Tertiary/University*	13 (81.3)	3 (18.7)	11.56 (1.86– 71.80)	0.009*	7.83 (1.09– 56.14)	0.040*

* Statistically significant at $p < 0.05$; COR = Crude Odds Ratio; AOR = Adjusted Odds Ratio; CI = Confidence Interval. The multivariate model adjusted for all variables in the table simultaneously.

Table 5(b): Factors associated with good PPE use practices – bivariate and multivariate logistic regression analysis

Variable	Good PPE Yes n (%)	Good PPE No n (%)	COR (95% CI)	p-value	AOR (95% CI)	p-value
Daily working hours						
<8 hours (ref)	57 (54.3)	48 (45.7)	1.00 [Ref]	—	1.00 [Ref]	—
>8 hours	30 (56.6)	23 (43.4)	1.10 (0.56–2.14)	0.782	0.94 (0.44–2.01)	0.877
Employment status						
Permanent (ref)	52 (64.2)	29 (35.8)	1.00 [Ref]	—	1.00 [Ref]	—
Temporary*	23 (42.6)	31 (57.4)	0.41 (0.20–0.84)	0.014*	0.38 (0.17–0.85)	0.018*
Contract	12 (52.3)	11 (47.8)	0.61 (0.24–1.55)	0.298	0.59 (0.21–1.65)	0.312
History of past workplace injury or illness						
Yes (ref)	63 (58.9)	44 (41.1)	1.00 [Ref]	—	1.00 [Ref]	—
No	24 (47.1)	27 (52.9)	0.62 (0.32–1.21)	0.164	0.71 (0.34–1.49)	0.364
Knowledge level on PPE						
Poor knowledge (ref)	16 (30.2)	37 (69.8)	1.00 [Ref]	—	1.00 [Ref]	—
Good knowledge*	71 (67.6)	34 (32.4)	4.83 (2.36–9.87)	<0.001*	3.91 (1.77–8.64)	<0.001*
Attitude towards PPE use						
Positive attitude (ref)	56 (73.7)	20 (26.3)	1.00 [Ref]	—	1.00 [Ref]	—



Negative attitude*	31 (37.8)	51 (62.2)	0.22 (0.11– 0.43)	<0.001*	0.27 (0.12– 0.60)	0.002*
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* Statistically significant at $p < 0.05$; COR = Crude Odds Ratio; AOR = Adjusted Odds Ratio; CI = Confidence Interval. The multivariate model adjusted for all variables in the table simultaneously.

4. Discussion

This study provides the first documented evidence on knowledge, attitudes, and practices concerning PPE use among coffee processing factory workers in Uganda. Taken together, the findings reveal a pattern consistent with what has been termed the 'KAP gap,' the persistent disparity between what workers know and believe about occupational safety, and what they actually do to protect themselves. While the majority of workers demonstrated reasonable levels of PPE knowledge and broadly positive attitudes, good PPE practices were observed in only just over half (55.1%) of participants. The findings have important implications for policy, practice, and future research in Uganda's growing agro-processing sector.

4.1 Knowledge About PPE

Two-thirds of workers (66.5%) had good composite knowledge about PPE. This compares favourably with studies conducted in similar low-resource industrial settings in Uganda, including a KAP study among welders in Nansana Municipality. (11) Though the study among welders reported somewhat higher knowledge levels, which could be attributed to the more urban context, higher educational attainment, and greater workshop-level training provision in that setting. The finding that 83.5% of workers had heard of PPE, with masks being the most recognised type, is consistent with evidence that COVID-19 public health messaging substantially normalised mask use across Uganda from 2020 onwards, creating a residual familiarity with respiratory protection even in non-clinical settings. (13).

4.2 Attitudes Towards PPE Use

A slight majority (51.9%) of participants held positive attitudes towards PPE use. High endorsement of the compulsory nature of PPE (74.1%) and expressed willingness to attend free training (75.3%) are encouraging findings that align with evidence from similar occupational settings in Uganda and the broader East African region. (11, 14). These attitudinal indicators suggest that a substantial proportion of workers are not resistant to safety practices in principle, but are constrained in their uptake by structural and organisational factors, notably the lack of employer-

provided PPE and the absence of formalised training programmes.

4.3 PPE Use Practices

While 69.6% of workers reported using at least one item of PPE during work, only 55.1% achieved the threshold for 'good' PPE practice based on the composite 8-item score. This discrepancy illustrates the distinction between any PPE use and adequate, consistent, and appropriate PPE use, a distinction with direct implications for the degree of hazard protection actually achieved. The relatively high prevalence of mask use compared with other protective items likely reflects both its wider availability and the residual influence of COVID-19 mask-wearing behaviour.

The finding that 70.3% of workers were personally responsible for sourcing their own PPE is a concerning result of this study. This practice directly contravenes the Uganda OHS Act (2006, amended 2023), which places the legal obligation of PPE provision squarely on employers. (7). This mirrors findings from Ugandan woodwork workshops. (15) and construction sites across sub-Saharan Africa (16), and reflects a broader pattern of OHS non-compliance in small and medium-scale industries operating below the threshold of effective labour inspection..

4.4 Factors Associated with Good PPE Practices

The multivariate model identified four independent predictors of good PPE practice, each with meaningful practical implications.

Education level was a significant positive predictor, with workers holding a tertiary or university education being substantially more likely to demonstrate good PPE practices (AOR=7.83; 95% CI: 1.09–56.14; $p=0.040$). This relationship is consistent with findings from a large Ethiopian textile factory study, which similarly found that higher education was independently associated with PPE compliance. (12). This reflects the mechanism that higher formal education fosters greater health literacy, a stronger capacity to engage with and act on safety information, and a greater sense of agency in asserting workplace rights.

Temporary employment was a significant inverse predictor of good PPE practices (AOR=0.38; 95% CI: 0.17–0.85;



p=0.018). Research consistently demonstrates that workers in temporary, contract, or informal employment arrangements face disproportionately higher rates of occupational injury and lower access to safety training, PPE, and health protections compared to their permanently employed counterparts. (17). A 2023 NIOSH study examining barriers to temporary worker safety found that temporary workers are more frequently placed in high-hazard roles without adequate site-specific orientation, receive less PPE training, and are less likely to exercise their right to refuse unsafe work due to fears of contract termination. (17). In the context of coffee processing, these structural disadvantages are compounded by the seasonal and informal nature of much of the temporary labour force, further distancing these workers from the provisions of formal OHS regulation.

Good knowledge of PPE remained strongly and independently associated with good practices (AOR=3.91; 95% CI: 1.77–8.64; p<0.001). This association, while expected from a KAP framework perspective (10) It is importantly sustained after adjustment for education, employment status, and attitudinal factors, suggesting that the knowledge-practice relationship is not simply a proxy for other sociodemographic advantages. A negative attitude towards PPE independently reduced the likelihood of good practices (AOR=0.27; 95% CI: 0.12–0.60; p=0.002), reinforcing the KAP model's core premise that attitudes serve as a mediating bridge between knowledge and practice [10]. The persistence of this association after adjusting for knowledge underscores that even workers with an adequate understanding of PPE may fail to use it if their attitudinal orientation towards personal safety is negative.

4.5 Generalizability of findings

The findings of this study should be generalised with caution. The sample was drawn exclusively from coffee processing factories in Kibinge Sub-County, a setting purposively selected because of its high concentration of coffee processing activity; workers in other sub-counties, other crop-processing sectors, or more urbanised industrial settings may differ in their knowledge, attitudes, and access to PPE. Nonetheless, because the sub-county shares structural features, including a predominance of small- and medium-scale factories, limited labour inspection, and reliance on manual dry processing, with much of the Greater Masaka coffee belt, the findings likely offer a reasonable approximation of KAP patterns among coffee processing workers elsewhere in the region, and may be cautiously extrapolated to other small-scale agro-processing industries

in Uganda with comparable regulatory and operational contexts.

5. Conclusions

Coffee processing factory workers in Kibinge Sub County demonstrate reasonable levels of knowledge and broadly positive attitudes towards PPE, yet only just over half practise PPE use. Critical structural barriers including widespread non-provision of PPE by employers and absence of formal training must be addressed to translate favourable knowledge and attitudes into consistent protective behaviour.

This study provides the first documented KAP evidence on PPE use in Uganda's coffee processing sector, establishing a baseline for future intervention research and programme evaluation. The findings are directly relevant to the implementation of Uganda's OHS Act (2006, amended 2023) and to the broader agenda of improving occupational health outcomes in the agricultural processing industries of sub-Saharan Africa.

6. Limitations

The cross-sectional design limits causal inference. Recall bias may have affected self-reported injury history and PPE use. The study did not include administrative workers and may not fully represent all factory roles. Generalisation beyond the study area should be done cautiously, given the purposive selection of the sub-county. The study also did not capture PPE use through direct observation across multiple work shifts, which would provide a more objective measure of practice.

7. Recommendations

Based on the study findings, the following recommendations are made:

The Government of Uganda should strengthen enforcement of the Occupational Health and Safety Act (2006), particularly regarding employer obligations to provide PPE and training in agricultural processing industries.

Factory managers and employers should take responsibility for supplying appropriate PPE to all workers free of charge and should institutionalise regular PPE training as part of onboarding and continuing workplace safety programmes.

District Health and Labour Offices should conduct routine workplace inspections and enforce penalties for non-compliance, especially in small and medium-scale factories. Future research should employ longitudinal designs or interventional studies to evaluate the effect of structured



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PPE training programmes on practice improvement in this sector.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from Makerere University School of Public Health. Written informed consent was obtained from all participants.

List of abbreviations

AOR	Adjusted Odds Ratio
CI	Confidence Interval
COR	Crude Odds Ratio
ILO	International Labour Organization
KAP	Knowledge, Attitudes, and Practices
LMIC	Low- and Middle-Income Countries
OHS	Occupational Health and Safety
OSH	Occupational Safety and Health
OSHD	Occupational Safety and Health Department
PPE	Personal Protective Equipment
SD	Standard Deviation

Author Biography

Ivan Ssebandeke is a first-class graduate of a Bachelor's degree in Environmental Health Science from Makerere University, with strong competencies in public health research, data analysis, and monitoring and evaluation. He has worked on numerous Research projects at Makerere University School of Public Health, supporting qualitative and mixed-methods studies across urban and informal settings, and as a Surveillance Officer with the World Health Organization Uganda during the 2025 Ebola Virus Disease outbreak response. He is actively engaged with the Youth in Evaluation Initiative (EvalYouth Global Network) and the Complexity, Innovative Research and Evaluation Methodologies (CIREM) Hub, and is a founding member and team lead of Launchpad Health Hub, a youth-led initiative advancing community health through public health research and local innovation. His research interests centre on environmental and occupational health, health equity, monitoring and evaluation, and health systems research, with a focus on generating locally relevant evidence to strengthen Health Systems in Africa and beyond.

Dr. Aloysius Ssenyonjo (MBChB, MSc, PGDME, PhD) is a Senior Lecturer at Makerere University School of Public Health (MakSPH) and Academic Coordinator of the Master of Public Health Monitoring and Evaluation programme since 2019. With over 12 years of professional experience,

Conflict of interest

The authors declare no conflict of interest.

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he is an interdisciplinary scholar whose work draws on public health, management science, political science, development studies, public administration, and economics, with research and teaching spanning health financing, policy evaluation, programme design and management, governance, multisectoral coordination, universal health coverage (UHC), and evidence-informed decision-making. He is particularly interested in non-conventional and innovative research and evaluation methodologies, including political economy analysis, realist evaluation, social network analysis, process tracing, contribution analysis, and outcome harvesting, and is the founding Director of the Complexity and Innovative Research and Evaluation Methodologies (CIREM) Hub within the Department of Health Policy Planning and Management at MakSPH. He holds a Bachelor of Medicine and Bachelor of Surgery from Makerere University, an MSc in Global Health and Public Policy from the University of Edinburgh, a first-class Postgraduate Diploma in Monitoring and Evaluation from the Uganda Management Institute, and a PhD in Development Studies from the University of Antwerp, Belgium, for which his thesis examined intragovernmental coordination for universal health coverage in Uganda. He has led and consulted on numerous research, evaluation, and capacity-building projects for organisations including Uganda's Ministry of Health, the World Health Organization, the World Bank, UNFPA, Results for Development, the Alliance for Health Policy and Systems Research, and ThinkWell Global, and previously served as Project Manager of the EU-funded Supporting Policy Engagement for Evidence-based Decision Making (SPEED) for UHC project (2015–2020). He is an active member of several international professional networks, including Health Systems Global, the International Public Policy Association, and the Africa Evidence Network, and served as President of the PhD Forum at MakSPH (2020–2022).



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