

## Original Research Article

# Do beverage workers in Enugu state Nigeria comply with health safety measures? A cross sectional study of two breweries

Uche Enuma Ezeoke<sup>1</sup>, John Basco Emmanuel Mamah<sup>2</sup>, Anne Chigedu Ndu<sup>3\*</sup>,  
Chinyere Ojiugo Mbachu<sup>4</sup>, Chinyere Cecilia Okeke<sup>4</sup>, Umeobieri Ancilla Kate<sup>4</sup>

<sup>1</sup>Department of Community Medicine, University of Nigeria College of Medicine, Enugu, Nigeria

<sup>2</sup>Department of Community Medicine, Enugu State University College of Medicine, Park Lane, Enugu, Nigeria

<sup>3</sup>Department of Community Medicine, College of Medicine University of Nigeria, Ituku, Ozalla, Enugu, Nigeria

<sup>4</sup>Department of Community Medicine, University of Nigeria Teaching Hospital, Ituku, Ozalla Health Policy Research Group, Enugu, Nigeria

**Received:** 05 June 2020

**Revised:** 01 July 2020

**Accepted:** 04 July 2020

### \*Correspondence:

Dr. Anne Chigedu Ndu,

E-mail: [anne\\_ndu@yahoo.com](mailto:anne_ndu@yahoo.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## ABSTRACT

**Background:** Some workplace accidents happen because workers fail to do their work in the safest possible way. Human beings have an innate desire to be safe, and their commitment to maintaining safe work environment is imperative for occupational health. However, employees' contributions to workplace accident and injury is underexplored.

**Methods:** Cross-sectional quantitative study was undertaken in two beverage industries in Enugu state. In order to observe a proportion of 50% in staff compliance to safety measures with precision of 5% and confidence level of 95%, 217 full-time employees were selected from each industry. Stratified sampling technique was used to select respondents across 5 units/departments. Data was collected using pre-tested structured questionnaire and analyzed using descriptive statistics. Statistical significance was set at  $p < 0.05$ .

**Results:** Use of any form of safety device was reportedly high among respondents, 413 (97.4%). However, only 278 (67.3%) reported using them on a daily basis. Aprons 103 (24.9%), helmets 163 (39.5%), and hand gloves 197 (47.4%) were the least commonly used safety devices. The only reason reported for inconsistent use of safety devices was discomfort. Consistent use of safety devices correlates significantly with demographic characteristics such as age, sex, level of education, length of years of work and unit/department ( $p < 0.001$ ), as well as previous history of workplace injury ( $p = 0.01$ ).

**Conclusions:** Consistent compliance with safety measures among factory workers is suboptimal and correlates significantly with demographic characteristics and previous history of workplace injury.

**Keywords:** Brewery workers, Compliance, Safety

## INTRODUCTION

Occupational health is concerned with identification and control of the risks arising from work place hazards so as to establish and maintain a safe and healthy work environment.<sup>1</sup> Most accidents in the workplace happen

when workers fail to do their work in the safest prescribed possible way.<sup>2-4</sup> This may be because they do not know about these hazards, the safety precautions they are supposed to adopt or simply because they are negligent.<sup>5</sup> In the beverage industries, workers are exposed to risks from various hazards such as poisonous

fumes, burns from industrial boilers, cuts from broken bottles or fragile items, fall from heights, road traffic accidents in the course of distribution and supply of products, musculoskeletal injuries from poor posture at work, and hearing impairments from noisy industrial plants.<sup>6</sup> Several safety measures have been recommended for minimizing exposure to industrial hazards. Some measures such as use of personal protective equipment, periodic medical examination and personal hygiene, require complete participation by employees to ensure effectiveness. Evidence shows that when workers are fully aware of and comply with recommended safety precautions and practices that minimize exposure to hazards, the impact on occupational health is positive and immense.<sup>7-9</sup>

Beverage industries are vital to the Nigerian economy because they provide employment opportunities to considerable numbers of skilled and unskilled workers. Safety and health in the workplace is necessary for the attainment of a viable business endeavour both for the employers, labour unions, governments and the society in general. Hence, any form of injury has economic implications for the worker, his/her family or dependents, and the community. Naturally the desire for safety is an intrinsic human pursuit.<sup>1</sup> Every individual in life whether employed or not, at the workplace or outside the workplace, has the innate desire to be safe. Therefore, the success of occupational health and safety measures depend on the commitment of individual workers to maintaining safe work environment.<sup>10-13</sup> Awareness of related occupational hazards, there are a few studies that have been undertaken in occupational health and safety of beverage industries in Nigeria. Majority of such have focused on the role of the employer in ensuring workplace safety. The contributions of employees to workplace accident and injury is an underexplored area in this sector. This study contributes additional knowledge on the role of employees in minimizing workplace injuries and accidents. It examines compliance with various safety measures among beverage industry workers, and matches their compliance with.

## METHODS

### *Description of study sites*

The study was undertaken in two major beverage manufacturing factories namely Seven-up Bottling Company (SBC) and Nigerian Bottling Company (NBC). Both companies are located in the Ninth-mile corner Industrial Area in Enugu state, Nigeria. Seven-up Bottling Company. Detailed description of Seven-up bottling company, Ngwo, Enugu plant. Department of Human Resources. Enugu, Nigeria. Nigeria Bottling Company. Detailed description of Nigerian bottling company, Ngwo, Enugu plant. Department of Human Resources. Enugu, Nigeria. SBC is the maker of Seven-Up, Mirinda and Pepsi beverages whereas NBC is the maker of Coca-cola brand beverages. Both factories are involved in production, storage and distribution of products to retail customers in and around Enugu state.

The Ninth-mile plant of SBC has a staff strength of 400 distributed into production 174, marketing 62, manufacturing 58, quality control 49, inventory 37 and administration 20. NBC has a staff strength of 580 distributed into production 231, marketing 96, manufacturing 81, quality control 71, inventory 51 and administration 50. The staff is made up of skilled and unskilled workers with varying levels of education. Both factories have functional 24-hour industrial clinics with part-time physicians and full-time nurses.

### *Study design and population*

Cross-sectional quantitative study design was used. The study population consisted of full-time non-administrative staff excluding health workers. Respondents were drawn from non-administrative units namely production, marketing, manufacturing, quality control and inventory. Inclusion criteria included workers who have been employed longer than six months and directly involved in the areas associated with hazards of the industry. All administrative and staff working outside the areas associated with hazards of the industry as well as staff that have worked less than 6 months were excluded. Ethical clearance and approval were obtained from Ethics Committee of University of Nigeria, Teaching Hospital Enugu.

**Table 1: Distribution of respondents across units/departments.**

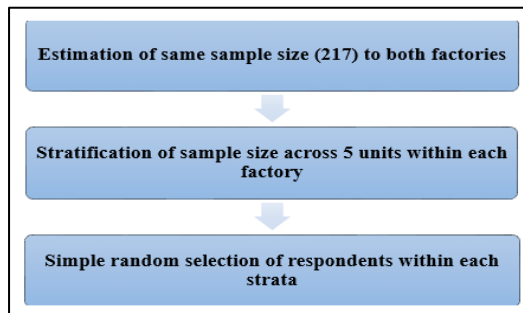
Unit/department	Seven-up bottling company			Nigeria bottling company		
	Number of staff in unit	Ratio to total	Number sampled (ratio*217)	Number of staff in unit	Ratio to total	Number sampled (ratio*217)
Production	174	0.46	99	231	0.44	94
Marketing	62	0.16	36	96	0.18	40
Manufacturing	58	0.15	34	81	0.15	33
Quality control	49	0.13	27	71	0.13	29
Inventory	37	0.1	21	51	0.1	21
Totals	380	1	217	530	1	217

### Sample size calculation and sampling design

In order to observe a proportion of 50% in staff compliance to safety measures with precision of 5% and confidence level of 95%, a minimum sample size of 197 was calculated for each factory and increased by 10% to 217 per factory. Within each factory, stratified sampling technique was used to select staff to be interviewed. Figure 1 illustrates the steps from estimation of sample size to selection of respondents in each factory, while Table 1 shows how the respondents were distributed across units. Stratification was done based on the five units and sample size per strata was estimated using the formula,

$$n\sigma = \frac{\text{Number of staff in unit/strata}}{\text{Total number of eligible staff in factory}} \times \text{Estimated sample size (217)}$$

where  $n\sigma$  = estimated sample size per strata



**Figure 1: Steps in selection of respondents.**

### Data collection and analysis

Pre-tested structured questionnaires were used to collect information on respondents' demographic characteristics, job-related characteristics, exposure and experience of workplace injury, use of safety devices in the workplace and frequency of use. Four research assistants were recruited and trained to administer the questionnaire.

## RESULTS

Out of the 434 questionnaires that were distributed, 424 were found to be adequate for analysis, giving a response rate of 97.7%. Table 2 shows that respondents were predominantly males, 390 (92%). Most of them were within 30-39 age category 229 (54%), and 210 (49.5%) had secondary level education. Their work-related characteristics showed that 176 (41.5%) had spent ≤4 years in the companies and 286 (67.5%) worked for eight hours or less.

Work-related injury was reported by 335 (79%) of the respondents, and this consisted majorly of skin laceration from broken bottles 226 (67.5%). Most injuries, 177 (52.8%), were reported to have occurred during night shifts. Only (54.5%) respondents reported their injuries to factory management.

**Table 2: Demographic and job-related characteristics of respondents.**

Variables	Frequency	Percent
<b>Age category (years)</b>		
≤29	132	31.1
30-39	229	54.0
≥40	63	14.9
<b>Sex</b>		
Male	390	92.0
Female	34	8.0
<b>Level of education</b>		
None	28	6.6
Primary	51	12.0
Secondary	210	49.5
Tertiary	135	31.8
<b>Length of years in factory</b>		
≤4	176	41.5
5-9	114	26.9
≥10	134	31.6
<b>Daily work hours</b>		
≤8	286	67.5
≥9	138	32.5
<b>Current department/unit</b>		
Production	189	44.6
Marketing	73	17.2
Manufacturing	65	15.3
Quality control	56	13.2
Inventory	41	9.7

**Table 3: Experience of and attitude to workplace injury among respondents.**

Variables	Frequency	Percent
<b>Ever experienced workplace injury</b>	335	79.0
<b>Types of injury experienced (n=335)</b>		
Skin laceration from broken bottles	226	67.5
Chemical burns	85	25.4
Impaired hearing	58	17.3
Musculoskeletal problems	56	16.7
Amputation by machine	58	17.3
Bruises	35	10.4
Fractures	23	6.9
Burns from industrial boilers	20	6.0
Other injuries	12	3.6
Chemical eye injury	10	3.0
<b>Time (shift hours) when injury was experienced</b>		
Morning shift	46	13.7
Afternoon shift	96	28.7
Night shift	177	52.8
Unsure/cannot recall	16	4.8
<b>Reporting of workplace injury</b>		
Reported injury to management	182	54.5
Did not report injury to management	153	45.5

Use of any form of safety device was reportedly high among respondents, 413 (97.4%). Ear plugs 274 (66.3%), safety boots 271 (65.6%), and goggles 229 (55.4%) were the most reported safety devices respondents used.

However, only 278 (67.3%) reported using safety devices on a daily basis (that is consistently). The only reported reason for inconsistent use of these resources was discomfort.

**Table 4: Use of safety devices in workplace among respondents.**

Variables	Frequency	Percentage
<b>Uses safety devices in workplace</b>	413	97.4
<b>Frequency of use of safety device (n=413)</b>		
Daily	278	67.3
Weekly	42	10.2
Occasionally	93	22.5
<b>*Types of safety devices used</b>		
Goggles	229	55.4
Ear plugs	274	66.3
Safety boots	271	65.6
Coveralls	209	50.6
Aprons	103	24.9
Helmets	163	39.5
Hand gloves	197	47.7
<b>*Reasons for use of safety devices</b>		
To protect self against accident	382	92.5
Instructed by management to do so	85	20.6
To fit into popular culture	19	4.6
<b>Reasons for non-use of safety devices (n=11)</b>		
They are uncomfortable	11	100

\*multiple options were allowed.

**Table 5: Demographic and work-related correlates of use of safety devices in the workplace.**

	*Consistent use of safety device; n (%)	*Inconsistent use of safety device; n (%)	$\chi^2$ (p value)
Demographic characteristics			
Age category (years)			
≤29	112 (84.8)	20 (15.2)	32.75 (<0.001)
30-39	121 (55.5)	97 (44.5)	
≥40	45 (71.4)	18 (28.6)	
Sex			
Male	265 (69.9)	114 (30.1)	14.24 (<0.001)
Female	13 (38.2)	21 (61.8)	
Level of education			
Primary	14 (35.0)	26 (65.0)	29.53 (<0.001)
Secondary	139 (66.2)	71 (33.8)	
Tertiary	108 (80.0)	27 (20.0)	
Work-related characteristics			
Length of years in factory			
≤4	133 (75.6)	43 (24.4)	19.23 (<0.001)
5-9	81 (71.1)	33 (28.9)	
≥10	64 (52.0)	59 (48.0)	
Current department/unit			
Production	134 (75.3)	44 (24.7)	28.01 (<0.001)
Marketing	33 (45.20)	40 (54.8)	
Manu-facturing	38 (58.5)	27 (41.5)	
Quality control	45 (80.4)	11 (19.6)	
Inventory	28 (68.3)	13 (31.7)	
Ever sustained workplace injury	208 (64.2)	116 (35.8)	6.63 (0.01)

\*consistent use refers to daily use while inconsistent use refers to weekly or occasional use of safety device

Table 5 shows that demographic and work-related characteristics such as age, sex, level of education and length of years of work have strong statistical correlation with frequency of use of safety devices in the work place ( $p < 0.001$ ).

Previous history of workplace injury also correlates significantly with consistency of use of workplace safety devices ( $p = 0.01$ ).

## DISCUSSION

We conducted a cross-sectional study among workers in a beverage company in Enugu state Nigeria.

The observed sex ratio shows that this is a male dominated occupation. This corroborates findings documented in similar beverage companies, where this was attributed to physical demands of the job such as heavy lifting and use of heavy vibrating machines.<sup>14</sup> Our findings showed that the frequency of work-related injury was high among the respondents with skin laceration being the commonest injury reported. This figure is higher than what has been reported among bottling company workers in other African countries, and this has implications for the health and safety of other workers. This is given that lacerations result in potential exposure of other workers to the blood/body fluids of an injured worker.<sup>15</sup> Unexpectedly, but interestingly, chemical burns were reported among these group of workers. Although most of the chemicals present in bottling plants are not extremely hazardous, every operation uses flammable substances, acids, caustics, corrosives and oxidants. Appropriate work practices should be developed so employees know how to work safely with these chemicals. These workers should be taught how properly to store, handle and dispose of the chemicals and how to wear protective gear. Eyewash stations and showers can minimize injury to anyone who is accidentally exposed to a hazardous chemical. All these should be done within the context of a well organize occupational health management system.

Most of the occupational accidents were reported to have occurred during night shifts. Some studies that estimated the relative risk of incidents in the morning, afternoon, and night shifts of 8-hour shift systems, in comparable working conditions, showed an increased risk of 18% in the afternoon shift, and of 30% in the night shift, as compared to morning shift.<sup>16</sup> This requires that attention is paid in scheduling night shifts to ensure that the risk from night shift work is minimized. The fact that only about half of the respondents reported their injuries to the factory management is of concern and may indicate some weakness in occupational health and safety management in the workplace. It is imperative to establish a system that supports and motivates appropriate reporting of workplace injuries. This is very useful for monitoring and continuous quality improvement of OHS programmes.

Although overall use of any form of safety device was high, consistent use was found to be not as generous. Inconsistent use of safety devices was attributed to discomfort and this in keeping with similar studies that have cited discomfort as a reason for non-compliance with personal protective equipment.<sup>17-19</sup> This inconsistency in the use of safety devices buttresses the fact that effective control of workplace hazards cannot be solely achieved through personal protective equipment.<sup>20</sup> Efforts must be put into administrative and engineering controls that minimize exposure of workers to potential and identified hazards, while supporting with personal protective equipment, continuous safety education, monitoring and supervision.

There are significant correlations between consistency of use of safety devices and demographic and work-related characteristics of respondents. Greater proportions of people who were 29 years or less reported consistent use of safety devices. Evidence shows that younger staff exhibit better compliance with organizational procedures because they are more likely to be found among lower cadres of staff. We also observed that consistent use of safety devices decreased with increasing length of years of work. Meaning that workers may lower their safety guards as they become more familiar with the workplace. In the reality of occupational hazards, lack of compliance that is driven by familiarity could have detrimental effects. Those who had tertiary education reported more consistent use and this is expected because their level of education should correlate with less risk taking. It is important to note, however, that some authors have reported that workers with less education used hearing protection 2.6 times more than those with higher education.<sup>21</sup> The reason for this is not clear and requires further enquiry. Although men reported consistent use more than females, the number of females in the study is inadequate to make any meaningful conclusions about sex and compliance with safety procedures.

## CONCLUSION

This study concludes that frequency of workplace injury is high among this group of workers. With the inconsistency found in the use of personal protective equipment, a case is made for an organised approach to the provision of occupational health services to these group of workers based on risk assessment to ensure that the workplace is made safer for these workers.

## ACKNOWLEDGEMENTS

The authors wish to thank the research assistants, Dimgba, Onyema, Onyebuchi and Frank, who did an excellent job of collecting data from the respondents.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

## REFERENCES

- Obionu CN. Introduction to occupational health. In: Synopsis of occupational and environmental health. 3rd edition. Enugu. Ezu Books Limited. 2015;1-46.
- World Health Organization. Occupational health: a manual for primary healthcare givers. 2001.
- Sambo MN, Idris SH, Shamang A. Determinants of occupational health hazards among roadside automobile mechanics in Zaria, North Western Nigeria. *Borno Med J*. 2012;9(1):5-9.
- Park K. Occupational health. In: Parks textbook of preventive and social medicine. 18<sup>th</sup> edition. Banarsidas Bhanot publishers; 2005;606-621.
- International Labour Organization. Your health and safety at work: Introduction to occupational health. Available at [www.actrav.ilo.org](http://www.actrav.ilo.org). Accessed on 12 June 2017.
- Michigan occupational safety and health administration. Hazards in the food and beverage industry. Available at: [www.michigan.gov/documents/cis\\_wsh\\_cet\\_0108\\_108504\\_7.html](http://www.michigan.gov/documents/cis_wsh_cet_0108_108504_7.html). Accessed on 23 June 2017.
- World Bank Group. Environmental, health and safety guidelines: Breweries. International Finance Cooperation document. 2007:1-17.
- Kadiri SA. Risk assessment and control. *Afr Occupational Health Safety*. 2010;20(2):35-7.
- World Health Organization. Health education. Available at: [www.who.int/topics/health\\_education/en](http://www.who.int/topics/health_education/en) Accessed on 12 September 2016.
- Lucas AO, Gilles HM. Concepts in public health and preventive medicine. In: Short textbook of public health medicine for the tropics. Revised 4th edition. London. Hodder Arnold publishers. 2003;1-27.
- Adebola JO. Knowledge, attitude and compliance with occupational health and safety practices among pipeline products and marketing company (PPMC) staff in Lagos. *Merit Res J Med Medic Sci*. 2014;2(8):158-73.
- Osonwa KO, Eko EJ, Ozah HP. Utilization of personal protective equipment (PPE) among wood factory workers in Calabar Municipality, Southern Nigeria. *Int J Sci Res*. 2015;4(5):2639-42.
- Aliyu AA, Saidu S. Pattern of occupational hazards and provisions of occupational health services and safety among workers of Kaduna refinery and petrochemical company Ltd. Kaduna, Nigeria. *Continental J Trop Med*. 2011;5(1):1-5.
- Aliyu SU, Ibrahim AM. Occupational risk and hazards exposure, knowledge of occupational health and safety practice. *J Harmonized Res Med Health Sci*. 2015;2(3):92-101.
- Mbonigaba E. To assess the prevalence of occupational health related risks and use of safety measures among employees in bralirwa processing industries in Rwanda. *Occup Med Health Aff*. 2015;3:215.
- Costa G. Shift work and health: current problems and preventive actions. *Saf Health Work*. 2010;1(2):112-23.
- Othman AA. A study of the causes and effects of contractors' non-compliance with the health and safety regulations in the South African construction industry. *Architectural Eng Design Manag*. 2012;8(3):180-91.
- Okello TR, Kansime, Odora J, Apio JA, Percorella I. Barriers and factors affecting personal protective equipment usage in St. Mary's hospital Lacor in Northern Uganda. *East Cent Afr J Surg*. 2017;2(1):59-65.
- Workers are risking injury by not wearing safety equipment. 2010. Available at: <https://www.ehstoday.com/ppe/hand-protection/workers-risking-injury-safety-equipment-6332>. Accessed on 23 June 2018.
- WHO. Hazard prevention and control in the work environment: Airborne dust. World Health Organization, Geneva Switzerland. 1999.
- Belin A, Zamparotti T, Tul K, Hernandez G, Graveling R. Occupational health and safety risks for the most vulnerable workers. *European Parliament*. 2011;12:55-9.

**Cite this article as:** Ezeoke UE, Mamah JBE, Ndu AC, Mbachu CO, Okeke CC, Kate UA. Do beverage workers in enugu state nigeria comply with health safety measures? A cross sectional study of two breweries. *Int J Community Med Public Health* 2020;7:2880-5.