Revue Scientifique Université La Source

ISSN: 3006-5763

Open Access

Knowledge, attitude and practices of welders in the informal sector of Coyah regarding occupational risks

F.Oularé[1,4], A.Kpogomou[1], N.Condé[2], AM.Diallo[2], S.Camara[2], JB.Day[3], AS.Magassouba[4], H. Bah[2]

Corresponding Author: F. Oularé, Email: fantasyllaoulare@gmail.com , Tel: +224 622 569 574

Institutions:

[1] Service de Médecine du Travail, Guinée
[2] Service de Médecine Légale, CHU Ignace Deen, Conakry, Guinée
[3] Service de Médecine Légale, CHU Ignace Deen, Conakry, Guinée
[4] Faculté des Sciences et Techniques de la Santé, Université Gamal Abdel Nasser de Conakry, Guinée

Abstract:
Introduction: Welding is a common industrial process associated with various health risks. The objective was to assess the knowledge, attitudes, and practices of welders in the informal sector regarding occupational hazards in Coyah. Methodology: This was a prospective, descriptive study conducted over one year, from February 16, 2021, to February 16, 2022. A total of 222 welders from 58 informal workshops in Coyah were included. Results: The majority of our respondents were male (98.65%). The average age was 26 ± 9.11 years, with a range from 10 to 60 years. The 21 to 30 age group (42.79%) was predominant. Among the welders, 71.62% were single, with a predominance of those without formal education (38.29%) and apprentices (69.37%). Welders with more than 30 months of professional experience represented 37.84%. In this study, 98.65% of workers were aware of the existence of various risks associated with their work. The most common complaints were injuries (82.43%), burns (78.38%), eye injuries (63.51%), and musculoskeletal disorders (63.06%). The majority of welders worked more than 8 hours a day. The use of inappropriate eyewear was 89.19%, followed by gloves (47.75%), work smocks (16.22%), face masks (12.61%), earplugs (8.11%), and safety shoes (5.86%). Conclusion: Welders were aware of occupational hazards in this study. However, this awareness did not translate into respect for ergonomics, the use of PPE, and did not provide the level of protection required.

Keywords: Knowledge, welders, occupational hazards, Coyah, Guinea

1 Introduction

The American Welding Society (AWS) defined welding as the process of connecting two metal parts to each other by the fusion of a metal called an electrode [1]. It is one of the dangerous quarries and the workers concerned are exposed to many risks. The health and safety risks are numerous and varied, and related on the one hand to heat, burns, radiation, noise, smoke, gases, uncomfortable postures and on the other hand to electrification and electrocution [3]. According to the World Health Organization (WHO), there are approximately 685 cases of occupational injuries per day worldwide [2]. One of the jobs that contribute to these occupational injuries (IP) is the welding process, especially in developing countries [3]. The increase in occupational health risks (OR) depends on the duration of exposure, the type of welding performed, the working environment and the protection used [4].In Nigeria in 2012 out of 405 welders, 9.63% have always used their eyemasks, 28.64% have used it occasionally and 61.73% have never used their eye masks [3,4].

In Guinea there are few previous studies on welders' knowledge, attitudes and practices in the face of occupational risks. Thus, given the multiplicity of health risks and the need to make better known the problems faced by welders motivated the choice of this theme: knowledge, attitudes and practices of welders in the informal sector of Coyah in the face of occupational risks.

2 Methods

Study Setting: This study was conducted in Coyah, Guinea.

Study Design and Duration: This was a prospective, descriptive cross-sectional study conducted over a one-year period, from February 16, 2021, to February 16, 2022.

Study Population: The target population consisted of

all welders working in the informal sector workshops within Coyah.

Inclusion Criteria: Welders working in informal sector workshops in Coyah who were present during the study period and provided informed consent to participate were included.

Exclusion Criteria: Welders working in the formal sector in Coyah and those absent during the study period were excluded.

Sample Size and Sampling Method: A comprehensive recruitment process was conducted to identify all eligible welders in the target area who met the inclusion criteria. The final sample size of 222 was determined by the number of eligible welders who consented to participate in the study. This approach aimed to be exhaustive within the constraints of participation.

Data Collection: Data were collected using a structured questionnaire. The questionnaire was translated and back-translated to ensure linguistic and cultural appropriateness. Welders were offered the questionnaire in their preferred language. Responses were recorded in French on the survey forms. Data were entered into Microsoft Excel 2013 and analyzed using Epi Info 7.2. Results are presented using tables and figures.

Study Variables: The study variables included both quantitative and qualitative data, categorized into four main areas: sociodemographic and occupational characteristics, knowledge of occupational hazards, attitudes towards occupational safety, and welding practices.

3 Results

In total, we interviewed 222 welders in 58 informal workshops in Coyah. The majority were men; the ratio M/F was 73. The mean age was 26 ± 9.11 years with extremes of 10 to 60 years. The age group of 21 to 30 years old (42.79%) was in the majority.

Table 1: Socio-demographic Characteristics of Welders

Characteristics	Number (N=222)	Percentage
Age		
10-20	95	42.79
21-30	95	42.79
31-40	41	18.47
41-50	10	4.5
51-60	7	3.16
Sex		
Female	3	1.35
Male	219	98.65
Level of education		
Higher	2	0.9
Secondary	52	23.42
Primary	75	33.78
No formal education	85	38.29
Koranic school	8	3.6
Marital status		
Single	159	71.62
Divorced	6	2.7
Married	57	25.68
Widower	10	7
Average age	26 ± 9.11 years	
Extreme	from 10 to 60 years	

Table 2: Professional Characteristics of Workers

Occupational characteristics of workers	Number	Percentage
Occupational status		
Learner	154	69.37
Master	66	29.73
Employee	2	0.9
Professional seniority (months)		
3-11 months	51	22.97
12-20 months	42	18.92
21-29 months	45	20.27
30 or more months	84	37.84
Number of hours worked per day		
8	56	25.2
More than 8	166	74.8
Vocational training in the profession		
Yes	76	34.23
No	146	65.77

In total, 98.65% of our respondents said they had already heard of the risks associated with their work (Figure 1). The most mentioned accidents in our study were injuries (82.43%) followed by burns (78.38%) and eye projections (63.51%). The most mentioned clinical sign was muscle pain. Figures 1 and 2 show the types of work-related accidents and illnesses mentioned.

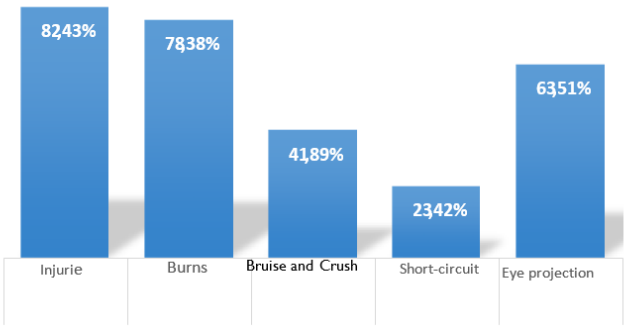

Figure 1: Distribution of welders according to knowledge of work-related accidents

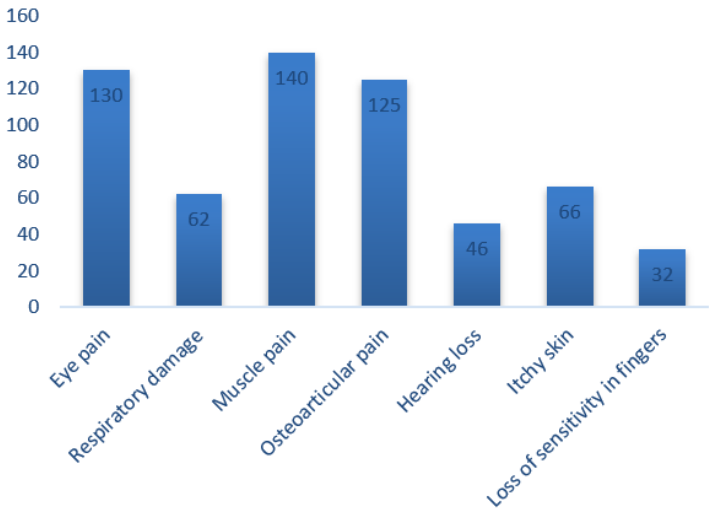

Figure 2: Distribution of welders according to knowledge of the signs of diseases mentioned

Regarding good welding practices such as the use of collective and personal protective equipment, only 2.25% of workshops were equipped for ventilation, a small proportion of welders (10.81%) used appropriate protective eyewear, and only 5.86% wore welder safety shoes without laces. Table 3 and Appendix Table 4 present the risks identified on welding stations and the preventive measures and means used to protect against the risks.

Table 3: Measures and Means of Prevention

Measures and means of prevention	**Effective**	**Percentage**
Use of collective prevention means		
Equipment emitting less noise	16	7.21
Periodic inspection of electrical installations	122	54.95
Presence of fire extinguisher	3	1.35
Ventilation equipment and collection system placed near the welding zone	5	2.25
Use of personal protection means		
Keeps combustible materials and flammable products away within a radius of 11 m	5	2.25
Wearing adequate clothing (thick, covering the entire body)	36	16.22
Wears welding shoes without laces, with anti-perforation soles	13	5.86
Protects eyes and face from hot metal splashes and radiation	121	54.5
Wearing tinted glasses of adequate opacity	24	10.81
Wears a welding helmet to protect facial skin	18	8.11
Wearing welding gloves	106	47.75

Note: Table 4 (in the appendix) shows the distribution of welders according to risks identified in welding workshops. Please refer to the Appendix for Table 4.

4 Discussion

Welding is an important professional activity in Guinea; And as with other professions, it is not without health risks. We conducted a one-year descriptive prospective study from February 16, 2021 to January 16, 2022. A total of 222 welders were surveyed in 58 workshops in the city of Coyah. The most common welding process was arc welding. The majority of our respondents were men; i.e. a frequency of 98.65%. This result could be explained by the fact that this job is messy, requires much more physical effort, and is reputed to be made for men. Karl K.K. T et al in 2020 in Ghana reported in their study that 97.9% of welders were predominantly male [5].

The mean age was 26 ±9.11 years with extremes of 10 to 60 years. A large proportion (42.79%) of the welders were between the ages of 21 and 30. The remark that the ma-

jority were in the 21-30 age group was probably due to the apprenticeship setting where there are younger apprentices working under their tutors (masters). Our result is similar to that of Ajayi et al, who found a large proportion (315, 78%) of welders aged 21 to 50. [6]. Of the respondents, 38.29% were mostly out of school. The reason for this predominance could be due to the lack of financial means of the parents on the one hand and on the other hand linked to the very low level of education of the latter who sometimes do not attach importance to the schooling of their children.

Shyam Sundar B et al had reported in their study a proportion of 93% of literate welders [7]. Most of our respondents were single (71.62%). This could be explained by the increased number of apprentices who lead a life dependent on their families or guardians. Another reason would be due to the fact that the dominant age group is between 21 and 30 years old, the age at which the marriage rate is relatively low.

In our series of studies, apprentices constituted more than half, 69.37% of the respondents, followed by tutors 29.73%. This distribution is in line with the characteristics of the informal sector, where workers work independently or in a family setting. The group with a professional seniority of 30 months or more was the most represented with a proportion of 37.84%. This result could be explained by the early learning of welding practice without any professional training.

Kumar SG et al in 2013 in India reported that 83.7% of their respondents had more than 5 years of work experience [8].

Among our respondents, 98.65% said they had already heard about the risks associated with their work. The risks most known to our respondents were hazardous materials, welding fumes, manual handling, noise, electrical risk, thermal environment and vibration. The reason why the majority of welders were aware of occupational hazards could be related to seniority in the trade. Several studies have reported in the literature that the welding profession can lead to several types of risks related to the lack of PPE [9,10,11].

Our series of studies showed that 65.77% of welders had not received any vocational training in the trade in schools or in the shop floor regarding good safe working practices (work organization and/or the use of PPE).

The reason why the 65.77% of our respondents had not received any training in the proper organization of work and/or the use of PPE, could be explained by the fact that workshop tutors and experienced workers do not often associate literary training with practice.

The most mentioned accidents in our study were injuries (82.43%) followed by burns (78.38%), eye projections (63.51%). Syed Moin Hassan et al in 2018 in Pakistan reported in their study that the most common accident was a foreign body in the eye (47.1%), followed by an eye arch injury (45.7%), cuts and wounds (50.0%), and burns (48.6%) [5]. The reason why our respondents were victims of these accidents could be due to the non-use or lack of PPE.

In our study, the diseases most reported by welders were muscle pain (63.06%), eye pain (60.81%) and osteoarticular pain (56.31%).

The reasons for the presence of these diseases could be related to age, awkward postures, carrying heavy loads and lack of eye protection.

Varun Venkatesh et al in 2017 in India found back pain and joint pain in their study population at frequencies of 63.9% and 6.4% respectively [3].

Gopal K et al in 2014 in India in their study, had reported that eye diseases were represented at 37 to 59%, while low back pain was at 23% [13].

The majority of welders in this study worked more than 8 hours. Among the number of hours worked per day, the most represented was 10 hours (25.68%). Sabitu k et al in 2009 in Nigeria reported in their study that the majority of welders worked more than 8 hours a day [12]. The reason for this majority may be due to non-compliance with the legal working hours in the informal sector.

Regarding the use of collective and personal protective equipment, only 2.25% of workshops were equipped for ventilation, a large proportion of welders (89.19%) used inappropriate protective glasses and only 5.86% used safety shoes. Varun Venkatesh et al in 2017 in India had reported in their study that the state of ventilation was insufficient at 6.9%, the use of glasses and boots was 74.8% and 91.4% respectively [13,14]. The inappropriate use of protective equipment by the majority of welders in this study is probably due to an individual factor (level of education and work experience) on the one hand and ignorance of the importance of protective measures on the other.

5 Conclusion

The welders were aware of the occupational hazards in this study. This awareness did not translate into respect for ergonomics, the use of PPE and did not offer the required level of protection. Inadequate attitudes and practices exposed them to several safety and health risks. Another study with biological and radiological assessments could strengthen the results obtained in this study.

6 Acknowledgements

On behalf of the research team, we express our sincere gratitude to all those who contributed to the completion of this study. We particularly thank the participants for their engagement, as well as the partners and collaborators for their support.

7 References

1. Mehrifar Y, Zeverdegani SK, Faraji M, Rismanchian M. Risk assessment of welders exposure to the released contaminated gases in different types of welding processes in a steel industry. *Health Scope.* 2018; 8(1): e58267.

2. Budhathoki SS, Singh SB, Niraula SR, Pokharel PK. Morbidity patterns among the welders of eastern Nepal: a cross-sectional study. *Ann Occup Environ Med.* 2016; 28:62.

3. Tadesse S, Bezabih K, Destaw B, Assefa Y. Awareness of occupational hazards and associated factors among welders in Lideta Sub-City, Addis Ababa, Ethiopia. *J Occup Med Toxicol.* 2016; 11:15.

4. Ajayi. A, Lyiade et Omotoye Olusola. J. Pattern of eye diseases among welders in a Nigerian community. 2012.

5. Syed Moin Hassan, Osama Nasir, et al. An assessment of the level of awareness and reported complaints regarding occupational health risks and the use of personal protective equipment among welders in Lahore, Pakistan. 2018.

6. Carl. KKT, Owusu. R, and Axame. WK. Prevalence and influencing factors of eye injuries among welders in Accra, Ghana. 2020.

7. Ajayi, IA, Adeoye, AO, Bekibele, CO, Onakpoya, OH and Omotoye, JO. Awareness and use of eye protection among welders in a community in southwest Nigeria. *Annals of African Medicine.* 2011; 10(4).

8. Budhathoki SS, Singh SB, Niraula SR, Pokharel PK. Morbidity patterns among the welders of eastern Nepal: a cross-sectional study. *Ann Occup Environ Med.* 2016; 28:62.

9. Kumar. SG, Dharanipriya A, Kar SS. Awareness of occupational injuries and use of safety measures among welders in South India. *Int J Occupy Environ Med.* 2013; 4(October 4), 252-172-7.

10. Zgambo, J. Occupational risks and use of protective equipment among small-scale welders in Lusaka, Zambia (Master's thesis, University of Bergen). 2015.

11. Tadesse S, Bezabih K, Destaw B, Assefa Y. Awareness of occupational hazards and associated factors among welders in Lideta Sub-City, Addis Ababa, Ethiopia. *J Occup Med Toxicol.* 2016; 11:15.

12. Joseph, N., Venkatesh, V., Akash, SK, Hegde, S., Moras, E. and Shenoy, NP. Occupational hazards – pattern, awareness and preventive measures among welders in unorganized sector in India. *Journal of Clinical and Diagnostic Research: JCDR.* 2017; 11(5), LC23.

13. Gopal Krishna Ingle. Exposure to occupational hazards and general health profiles of welders in rural Delhi. 2014.

14. Sabitu K, Iliyasu Z, Dauda MM. Awareness of occupational hazards and utilization of safety measures among welders in Kaduna Metropolis, Northern Nigeria. *Ann Afr Med.* 2009; 8(1):46–51.

7.1 Appendix

Table 4: Distribution of Welders According to the Risks Identified in Welding Workshops

Hazard Family	Danger	Conditions of Exposure	Potential Damage	Number Exposed/222
Ergonomic risk	Uncomfortable squatting postures, prolonged standing	Cutting and assembly of metals	Muscle pain	201
Risk linked to the activity	Manual handling	Assembly and transport of finished doors, windows, and gates	Low back pain, musculoskeletal disorders	222
Sound environment	Noise	Cutting, sawing, and drilling of metals	Hearing fatigue, reduced concentration, hypoacusis, occupational deafness	207
		Insufficient daytime and nighttime lighting in almost all workshops		
Thermal environment	Heat, Welding smoke	Produced by the electric arc during welding	Visual and respiratory problems, burns, cancer	201
		Frequent welding outdoors (in the open air) but often lack of ventilation of the premises in certain workshops		
Risk linked to vibrations	Hand-arm vibrations	Drilling	Angioneurotic disorders, Raynaud syndrome	89
		No means in place, gloves are not worn		
Electrical risks	Electricity	Walking on bare live electrical wires	Electrification, electrocution	132
		Gloves and safety shoes where worn		
Fire-explosion risks	Formation of an explosive atmosphere with hydrogen from welding smoke, gas shells	Arc welding	Burns, CO poisoning, material losses, death	198
		Absence of fire extinguisher and equipment ventilation		

To Cite this Article

Oularé, F., Kpogomou, A., Condé, N., Diallo, AM., Camara, S., Day, JB., Magassouba, AS., Bah, H. (2024). Knowledge, Attitude and Practices of Welders in the Informal Sector of Coyah Regarding Occupational Risks. *Revue Scientifique Université La Source*, 1(1), 1-6.

Dates

- Received: January 15, 2023
- Revised: September 1, 2023
- Accepted: November 15, 2023
- Published Online: March 1, 2024

Author Contributions

- **F. Oularé**: Conceptualization, Methodology, Investigation, Writing - Original Draft, Project administration.
- **A. Kpogomou**: Data Curation, Formal analysis, Visualization.
- **N. Condé**: Validation, Resources.
- **AM. Diallo**: Supervision, Writing - Review & Editing.
- **S. Camara**: Investigation, Data Collection.
- **JB. Day**: Methodology, Software.
- **AS. Magassouba**: Project administration.
- **H. Bah**: Writing - Review & Editing, Validation.

Funding

This research received no external funding.

Conflict of Interest

The authors declare no conflict of interest.

Ethical Approval

The research was conducted in accordance with the principles outlined in the Declaration of Helsinki.

Data Availability

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy concerns.