



## OCCUPATIONAL SAFETY AWARENESS MEASURING TOOL AMONG AGRICULTURAL WORKERS IN NORTH MACEDONIA

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*Abstract: Agricultural workers in North Macedonia are a marginalized group of informal and self-employed workers in a family business, with no legal employment documents, health insurance, and limited access to Occupational Safety and Health (OSH) resources. The incidence rate of injuries in agriculture where children are often among the victims, imposes the need to create a valid Occupational Safety Awareness Measuring Tool (OSAMT), what is the main goal of this study. To develop the OSAMT, a combined method was applied with questions created by OSH experts and direct interviews with a sample of 33 workers from the eastern region of North Macedonia. A detailed literature review was also applied. The final version consists of 42 items distributed among 4 factors: availability of OSH information, understanding of OSH, assessment of information quality and use of Information. The success of the model was confirmed by a final confirmatory analysis. OSAMT is a valid tool for measuring OSH awareness among agricultural workers, that can serve as a benefit for improving OSH and encouraging education in order to reduce the high incidence of work-related accidents and deaths in North Macedonia.*

*Key words: Agricultural workers, Awareness, Occupational safety, Measuring tool.*

### 1 INTRODUCTION

Most self-employed agricultural workers in North Macedonia are not covered by the OSH legislation. With limited access to OSH resources, no legal employment

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documents, health insurance, insufficient education and often no resources to invest in new safer infrastructure [1], agriculture is a dangerous industry worldwide. The major challenges in enumerating the size of the workforce and the number of occupational accidents are an additional problem [2].

In general, informal workers who are mostly unskilled labor, young and old individuals or self-employed or hourly wage earners, do not have a set regular working hours and are likely to either work at home or in the service of the agricultural industry [3]. These workers, especially in low- and middle-income countries, have a low OSH awareness level and a higher incidence of work-related injuries and illnesses [4,5].

In North Macedonia, according to the National Classification of Activities (NCA), the activities of households as employers, in large part include agricultural works. If these people are registered as agricultural workers, then 50% of the reported injuries in this industry in 2023 ended fatally [6], and unfortunately children are often the victims.

Although reporting injuries is a legal obligation, the Health and Safety Executive (HSE) estimates that globally, only 16% of the most serious farming injuries are reported each year [7]. Due to the underreporting problem in our country, the incidence rate of injuries for 2023 is 13.42 [6]. This is an incomparable value with incidence rates in EU countries that reach over 3000 in Eurostat reports. [8].

Therefore, reducing health risks and increasing the quality of life must be based on skills and competencies that individuals develop to search, understand, evaluate and use health and safety information [9].

For the last decade, several health literacy instruments have been developed in different countries [10,11].

The Occupational Safety Awareness Measuring Tool (OSAMT) for informal agricultural workers is consistent with the concept of safety literacy. This tool measures cognitive abilities of an individual in gaining access to, understanding, evaluating, and applying of safety information.

## **2 MATERIAL AND METHODS**

The main goal of this study was to create a valid Occupational Safety Awareness Measuring Tool (OSAMT) to contribute to raising awareness of OSH and reducing the rate of injuries in agriculture. The research was realized by using the questionnaire (<http://creativecommons.org/licenses/by-nc-nd/4.0/>) from the Thai Occupational Health Literacy Scale (TOHLS-IF), [3]. During the use of the questionnaire, some questions were changed in order to adapt them for conducting research on agricultural workers in North Macedonia.

The final version consists of 42 items distributed among 4 factors: availability of OSH information, understanding of OSH, assessment of information quality and use of Information. The success of the model was confirmed by a final confirmatory analysis. The rating scale was used from the given questionnaire. A total of 33 agricultural workers responded to the survey.

The percentage of positive answers for each factor separately, as well as for the entire questionnaire, is given in the table below, (Table 1).

Table 1. Percentage of positive answers in the questionnaire

		Percentage of positive answers [%]
Factor 1	Availability of OSH information	55.45
Factor 2	Understanding of OSH	71.01
Factor 3	Assessment of information quality	66.36
Factor 4	Use of Information	73.48
Total:	Survey questionnaire	67.46

Based on the answers received, all percentages of the four factors, as well as the total percentage of the entire survey questionnaire, are in the range of 50% to 74%. It can be concluded that: agricultural workers have a basic knowledge of safety and health in the workplace.

### 3 RESULTS AND DISCUSSION

#### 3.1 Determining the addiction between gender and OSH awareness

By using Pearson's chi square test we will determine the independence of the characteristics. It is checked whether gender and OSH awareness are independent characteristics with a significance level of the test of  $\alpha = 5\%$ . The null hypothesis is that the characteristics are independent.

According to gender, 23 men and 10 women were surveyed (Fig. 1).

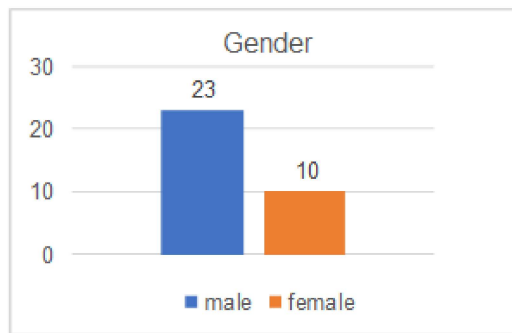


Figure 1. Dependence on gender and OSH awareness

We are recording contingency tables for the two characteristics gender and OSH awareness (Table 2).

Table 2. Contingency table for gender and OSH awareness

Awareness	Gender		$\chi^2$
	male	female	
yes	0.23079	0.538509	
partially	1.34127	3.12963	
no	0.585579	1.366351	
			7.192128

The value of  $\chi^2 = 7.1921$ , degree of freedom is  $df = 2$ , and also the value of  $p = 0.0274 < 0.05 = \alpha$ . Since the value of  $p$  is less than  $\alpha$ , it follows that the null hypothesis is rejected, i.e. gender and awareness are dependent characteristics. This means that the level of OSH awareness of the respondent can be determined by his gender.

### 3.2 Determining the addiction between age and OSH awareness

On the other hand, to check whether age and OSH awareness are independent characteristics with a test significance level of  $\alpha = 5\%$ . The null hypothesis is that the characteristics are independent. According to age, 5 farmers up to 18 years old, 22 from 18 to 60 years old, and 6 older than 60 years old were surveyed (Fig. 2).

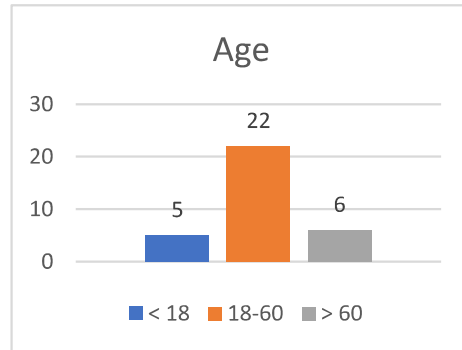


Figure 2. *Dependence on age and OSH awareness*

We are recording contingency tables for the two characteristics age and OSH awareness (Table 3).

Table 3. *Contingency table for age and OSH awareness*

Awareness	Age			$\chi^2$
	< 18	18 – 60	> 60	
yes	3.744754	0.966012	0.118541	
partially	0.680967	0.312727	3.128192	
no	5.017764	6.213461	9.311129	
				29.49355

The value of  $\chi^2 = 29.4935$ , degree of freedom is  $df = 4$ , and also the value of  $p = 0.6 \cdot 10^{-6} < 0.05 = \alpha$ . It follows that the null hypothesis is rejected, i.e. age and awareness are dependent characteristics. The OSH awareness of the respondent can be determined by age. Agricultural workers aged 18 to 60 are the best informed.

### 3.3 Determining the addiction between education and OSH awareness

To check whether education and OSH awareness are dependent characteristics with a test significance level of  $\alpha = 5\%$ . The null hypothesis is that the variables are independent.

According to education, 14 farmers with primary, 15 with secondary and 4 with higher education were surveyed (Fig. 3).

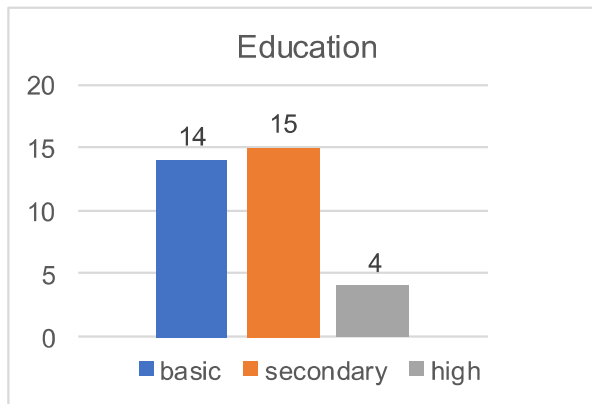


Figure 3. Dependence on education and OSH awareness

We are recording contingency tables for the two characteristics education and OSH awareness (Table 4).

Table 4. Contingency table for education and OSH awareness

Awareness	Education			$\chi^2$
	basic	secondary	high	
yes	13.10664	4.416592	7.307871	
partially	15.56749	12.99677	0.16018	
no	0.74721	1.73989	17.40138	
				73.44403

The value of  $\chi^2 = 73.4440$ , degree of freedom is  $df = 4$ , and also the value of  $p = 4.25 \cdot 10^{-15} < 0.05 = \alpha$ . It follows that the null hypothesis is rejected, i.e. education and awareness are dependent characteristics. From the respondent's education, we can already determine his awareness of OSH. Agricultural workers with higher education are the best informed.

#### 4 CONCLUSION

OSH literacy is the capacity to obtain, interpret and understand basic safety information and services, and the competence to use them in manners that promote and maintain health. Educational and safety training resources are not available to many informal workers, so the lack of education and safety resources makes this segment of the population more vulnerable to occupational injuries, adverse health conditions, and even death.

According to the analyzes made and the rejection of the null hypotheses in the research, the dependence of awareness on other characteristics, gender, age and education is confirmed.

In conclusion, the total percentage of positive answers in the survey questionnaire, ranging from 50% to 74%, show that agricultural workers with basic knowledge of OSH and significant gaps in understanding the rules of safety at work, must be directed to enhanced training and upgrading of education.

OSAMT is a valid tool for measuring OSH awareness among agricultural workers, that can serve as a benefit for improving OSH and encouraging education in order to reduce the high incidence of work-related accidents and deaths in North Macedonia.

## **NOMENCLATURE**

*df* degree of freedom

*p* statistical value

### **Greek symbols**

$\alpha$  significance level of the test

$\chi^2$  Pearson's chi square test

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