

Assessment of the Knowledge, Attitudes and Perception of Potential Occupational Hazards by Automobile Workers in Makurdi, Benue State, Nigeria

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Abstract: The objective of this study is to assess the knowledge and perception of Automobile workers on the occupational hazards in their workplaces and to identify their attitudes and safety practices towards protecting themselves from these hazards. A descriptive cross-sectional design and stratified sampling technique were utilized to identify the automobile workers/respondents. A structured questionnaire was used for data collection and it covered areas like social demographics, knowledge and perception of potential hazards, attitude and safety practices employed by both Automobile Mechanics (AMs) and Automobile Spray Painters (ASPs) to avoid hazards. The data collected was analyzed using SPSS version 21. Findings showed that there was statistically significant association between level of knowledge, attitude, perception of spray painters and mechanics based on their level of education. Also there was statistically significant association between level of knowledge, attitude, perception of spray painters and mechanics based on their work experience in relation to safety measures ($p < 0.05$). However, there was no statistical significant difference in the knowledge of spray painters and mechanics about PPE as it can be generally rated poor ($< 50\%$), $P > 0.05$). The p value for each of the tested parameter (> 0.05) also shows clearly that there was no significant difference in the knowledge of both the Automobile spray printer and the Mechanics. There is need for regular training on safety guidelines and enforcement of standard/universal safety practices by automobile workers so as to reduce potential occupational hazards.

Keywords: Personal Protective Equipment (PPE), Automobile Mechanics (AMs), Automobile Spray Painters (ASPs)

1. Introduction

The cost of labor is very cheap and this is due level of poverty is high in developing countries such as Nigeria. Proper occupational hygiene and pollution control methods are often neglected at worksites [1]. The garage operators

also known as Automobile Mechanics (AMs) and Automobile Spray Painters (ASPs) are low-income earners with little or no basic education and limited knowledge of modern technology to operate effectively [2]. Automobile

workshop workers are a class of labor considered to be prone to long-term lead toxicity due to their routine works such as motor vehicle assembly, spray painting, burning of petrol, welding, brazing and repairing of radiators [3]. In Nigeria, there is lack of sufficient safety information and safety magazines and/or pamphlets [4]. Personal protective equipment are usually considered a luxury and rarely provided and it is worse among the small factory workers [1].

In Modern societies like Nigeria, automobiles are considered as an integral part which are known as the source of environmental contaminants that are very toxic to humans [5].

AMs and ASPs which are also known as are required to apply chemicals which can be hazardous to human health in order perform repairs on vehicles. The application of chemicals used are typically involves the spraying of aerosolized agents onto a part or surface of car [6]. The spraying of commonly used chemicals such as Nitrocellulose thinner, Polyisocyanates and other hydrocarbons are the most effective means of applying solvents, penetrating lubricants and cleaners to often oddly shaped or difficult to reach parts of a vehicle [7]. Ironically, the ease of application for these chemicals is that they become airborne and can easily be inhaled into the respiratory system [8]. Although different individuals have different sensitivity, reactivity and irritation levels to the chemicals, even at low concentrations, many solvents and solids in paints have specific threshold limit values (TLVs) [NIOSH., 1978]., thus different exposure values and guidelines require controlled exposure monitoring to establish the appropriate and effective protection methods [9].

Conducting a survey study on the knowledge and perception of Automobile workers on the occupational hazards in their workplaces and to identify their attitudes and safety practices towards protecting themselves from these hazards will not be out of place in order to unravel salient information, whether there is a need for improvement on the modules operandi of the automobile activities in the state. Hence this study was intended to bridge this gap of knowledge regarding the practices in Makurdi Local Government, Benue State, Nigeria. It will serve as a strong compass to guide in the next line of action for all stakeholders involved in automobile practices.

2. Methods

This study is a cross-sectional survey study. Data was obtained through administering questionnaire on the automobile workers, after a due pilot study was conducted with it, and appraised by the erudite researchers. Six research assistants from Makurdi Local government and Hospital management boards were trained on how to administer the questionnaire and were fully involved in the data collection process. Data were analyzed using descriptive statistics of frequencies, percentages, and pie charts. Inferential statistics of Chi-square was used to test for significant associations between socio-demographic variables and the practices of the automobile workers, and their perception on the chemicals-hydrocarbons frequently used in general.

The scoring of section was based on the answer ticked and was rated with points as strongly agree-5, agree-4, not sure-3, disagree-2, strongly disagree-1. The total score in percent will be rated good, moderate or poor. A respondent that scored 75% and above will be rated good, those that scored between 50%-74% will be rated moderate and below 50% will be rated poor. Statistical level of significance was set at P-value <0.05.

3. Results

A total of One Hundred and Seventeen (117) respondents were interviewed out of which One Hundred and five (105) questionnaires were recovered giving a response rate of 90%.

SOCIO-DEMOGRAPHIC DATA

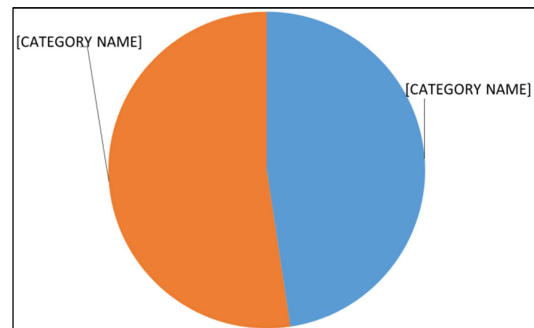


Figure 1. Occupation of Automobile workers.

Table 1. Socio-demographic Parameters of Automobile workers.

		OCCUPATION		
Parameters		Automobile Spray Painters (n = 50)	Mechanics (n = 55)	Total (n = 105)
		Number (%)	Number (%)	Number (%)
Marital status	Single	12 (24.0%)	6 (10.9%)	18 (17.1%)
	Married	34 (68.0%)	47 (85.5%)	81 (77.1%)
	Separated	4 (4.0%)	2 (2.6%)	6 (5.8%)
Religion	Christianity	30 (60.0%)	36 (65.5%)	66 (62.9%)
	Islam	20 (40.0%)	19 (34.5%)	39 (37.1%)
	No Formal Education	23 (46.0%)	28 (50.9%)	51 (48.6%)
Level of education	Primary	7 (14.0%)	5 (9.1%)	12 (11.4%)
	Secondary	17 (34.0%)	13 (23.6%)	30 (28.6%)
	Diploma	1 (2.0%)	8 (14.5%)	9 (8.6%)
	First Degree	2 (4.0%)	1 (1.8%)	3 (2.9%)
Time Spent in work	1 - 2 years	2 (4.0%)	4 (7.3%)	6 (5.7%)
	3 - 5 years	10 (20.0%)	11 (20.0%)	21 (20%)
	> 5 years	38 (76.0%)	40 (72.7%)	78 (74.5%)

Most of the respondents were married 81 (77.1%), followed by 18 (17.1%) for single, 6 (5.8%) for separated while none was divorced or widowed.

Table 2. Age category.

Age Group	Frequency	Percent
20 & below	3	2.9
21 - 30	25	23.8
31 - 40	35	33.3
41 - 50	19	18.1
51 - 60	14	13.3
Above 60	9	8.6
Total	105	100.0

The minimum age (in years) of the respondents was 19 and the maximum was 72 with the most frequent age being 35 while the median and the mean ages were 38 and 40 ± 13 respectively.

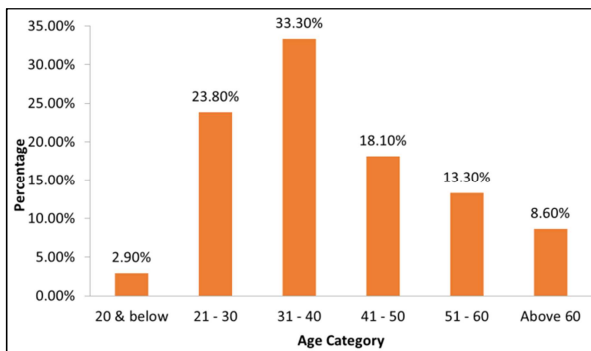


Figure 2. Age Category.

Automobile spray painting and mechanical work are considered to be hard to do and are therefore meant for youths and young adults.

Table 3. Monthly Income.

Income	Frequency	Percent
<=5000	48	45.7
5001 - 18000	30	28.6
18001 - 30000	15	14.3
30001 - 50000	6	5.7
50001 - 100000	6	5.7
Total	105	100.0

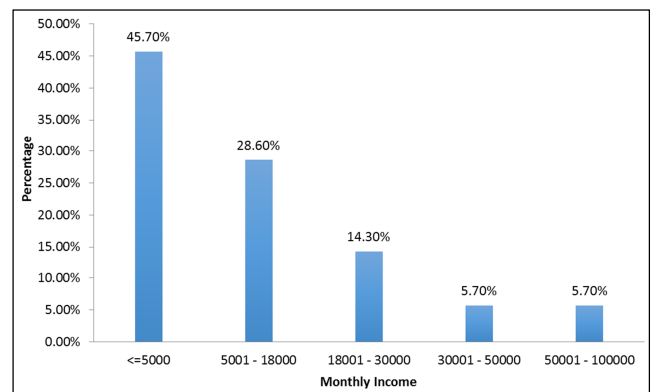


Figure 3. Monthly income.

Table 4. Knowledge of components/ingredients of used chemicals by occupation.

Occupation					
Question	Response	Automobile Spray Painters	Mechanics	Total (%)	p
		Number (%)	Number (%)		
Do you know the components/ingredients	Yes	13 (26.0%)	14 (25.5%)	27 (25.7%)	0.949
If yes, do you know the effects	Yes	7 (14.0%)	11 (20.0%)	18 (17.1%)	0.415
If yes, state the effects	Cough	3 (6.0%)	3 (5.5%)	6 (33.3%)	0.245
	Fuel	-	3 (5.5%)	3 (16.7%)	
	Nil	4 (94.0%)	5 (89.0%)	9 (50.0%)	
What do you know about Aromatic solvents	No knowledge	50 (100.0%)	55 (100.0%)	55 (100.0%)	-
Inhale any of these chemicals while working?	Yes	48 (96.0%)	51 (92.7%)	99 (94.3%)	0.521
Chemicals have direct contact with your skin?	Yes	50 (100.0%)	55 (100.0%)	105 (100%)	-
Do any periodic medical checkup?	Yes	10 (20.0%)	2 (3.6%)	12 (11.4%)	0.008
If yes, when was the last time?	< 1 year	6 (60.0%)	-	6 (50.0%)	0.027
	1 -2 years ago	1 (10.0%)	2 (100.0%)	3 (25.0%)	
	2 - 3 years ago	3 (30.0%)	-	3 (25.0%)	

P > 005 is insignificant at 95% confidence interval.

Only 13 (26%) of 55 spray painters, 14 (25.5%) of mechanics and 27 (25.7%) of 105 (total) were aware of the ingredients of the chemicals they use.

Table 5. Knowledge about personal protective equipment.

Occupation					
Question	Response	Automobile Spray Painters	Mechanics		p
		Number (%)	Number (%)	Total (%)	
What is personal protective equipment?	Boots and Gloves	11 (22.0%)	16 (29.1%)	27 (25.7%)	0.682
	Used for protection	5 (10.0%)	7 (12.7%)	12 (11.4%)	
	Nose Mask	33 (66.0%)	30 (54.5%)	63 (60.0%)	
	To prevent disease	1 (2.0%)	2 (3.6%)	3 (2.9%)	
Wear personal protective equipment?	Yes	21 (42.0%)	24 (43.6%)	45 (42.9%)	0.866
You may/or have catarrh or cough?	Yes	26 (52.0%)	37 (67.3%)	63 (60.0%)	0.111
	Can't remember	10 (38.5%)	18 (48.6%)	28 (26.7%)	
If yes, please state when this started?	<1yr	2 (7.7%)	5 (13.5%)	7 (6.7%)	0.200
	4-5yrs	-	1 (2.7%)	1 (1.0%)	
	>10yrs	3 (11.5%)	-	3 (2.9%)	
	On and Off	11 (42.3%)	13 (35.1%)	24 (22.9%)	

P > 005 is insignificant at 95% confidence interval.

Most 63 (60.0%) of the respondents defined personal protective equipment (PPE) as nose mask, 66% of spray printers and 54.5% of mechanics also called PPE nose mask.

Table 6. Knowledge, attitude and perception about occupational risk/hazard and safety measures.

Parameter	Occupation (% mean \pm SD)			p
	Automobile Spray Painters (n = 50)	Mechanics (n = 55)	Total (n = 105)	
Knowledge of Occupational Hazard/Risk (Q ₂₃ – Q ₂₉)	12.43 \pm 13.03	14.81 \pm 14.52	13.67 \pm 13.81	0.381
Attitude towards risks/hazard (Q ₃₀ – Q ₃₈)	25.25 \pm 18.91	26.81 \pm 14.80	26.07 \pm 16.81	0.635
Perception of risk of occupational hazard (Q ₃₉ – Q ₄₇)	13.33 \pm 11.70	16.82 \pm 12.01	15.16 \pm 11.94	0.136
Safety measures (Q ₄₈ – Q ₅₅)	30.75 \pm 24.12	27.27 \pm 30.91	28.92 \pm 27.81	0.525

P > 005 is insignificant at 95% confidence interval.

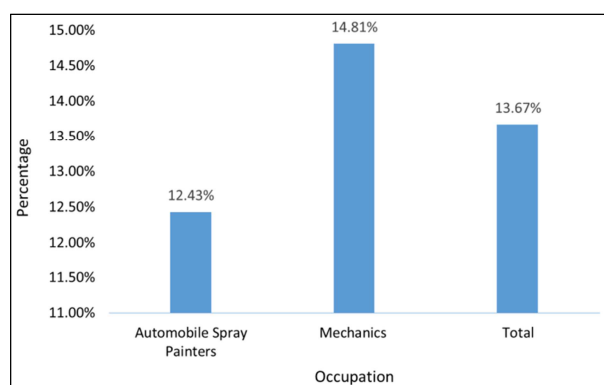


Figure 4. Knowledge of Occupational Hazard/Risk.

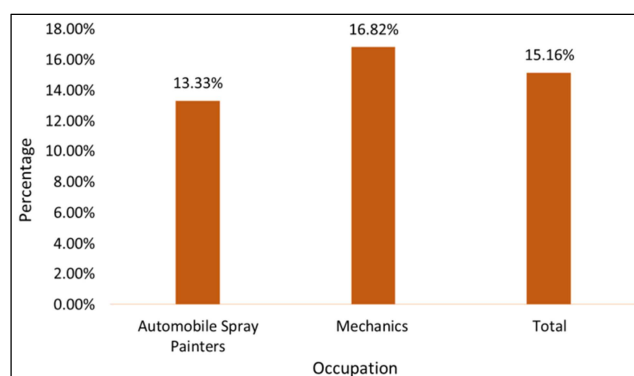


Figure 6. Perception of risk of occupational hazard.

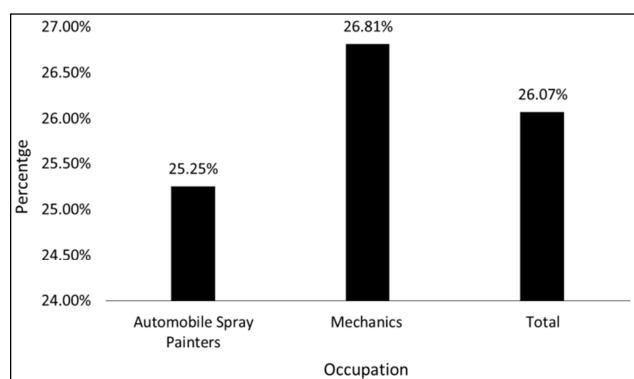


Figure 5. Attitude towards risks/hazard.

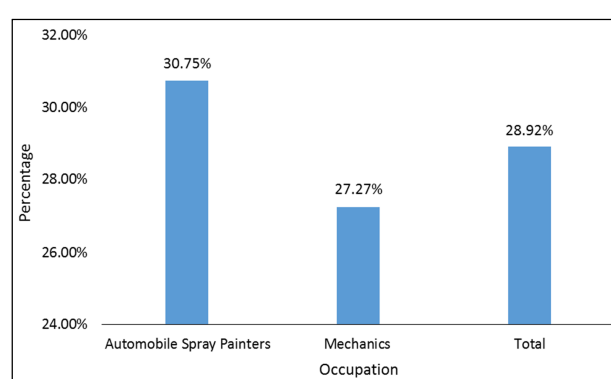


Figure 7. Safety measures.

Table 7. Effect of education on Knowledge, attitude and perception about occupational risk/hazard and safety measures.

Knowledge	Education	N	% Mean	Std. Deviation	p
Knowledge of Occupational Hazard/Risk	No formal Education	51	23.11	12.74	<0.001
	Primary	12	7.14	5.90	
	Secondary	30	4.29	8.72	
	Diploma	9	4.76	4.72	
	First degree	3	-	-	
Attitude towards risks/hazard	No formal Education	51	37.01	14.85	<0.001
	Primary	12	14.58	9.48	
	Secondary	30	17.92	11.06	
	Diploma	9	15.28	11.60	
	First degree	3	-	-	
Perception of risk of occupation	No formal Education	51	20.59	10.67	<0.001
	Primary	12	9.03	11.49	
	Secondary	30	10.00	10.28	
	Diploma	9	14.81	12.11	
	First degree	3	-	-	
Safety measures	No formal Education	51	16.18	23.62	<0.001
	Primary	12	40.63	28.27	
	Secondary	30	46.25	25.46	
	Diploma	9	20.83	22.53	
	First degree	3	50.00	-	

Most respondents did not have formal education, so it is not surprised seeing that they recorded higher knowledge of the first three questions.

4. Discussion

A total of One Hundred and Five (105) respondents were interviewed out of which One Hundred and five (105) questionnaires fully responded during the collection of data through were recovered giving a response rate of 100%. Most of the respondents were married 81 (77.1%), followed by 18 (17.1%) for single, 6 (5.8%) for separated while none were divorced or widowed. There were 66 (62.9%) Christians and 39 (37.1%) Muslims. Sixty percent (62) of the respondents had their highest education level stopped at primary school with 51 (48.6%) of no formal education and 12 (11.4%) who had primary education. This is in agreement with study conducted by Agnes [10].

30 (28.6%) had secondary school certificates, 9 (8.6%) had diploma out of which 8 were Auto mechanics and 1 was spray painter. There were 3 (2.9%) respondents who had first degree of which 2 were automobile spray painters and one was an auto mechanic. None had MSc or PhD degrees. Most 78 (74.5%) of the respondents had spent over 5 years in their current occupation, 21 (20.0%) had been doing the work between 3 – 5 years while few 6 (5.7%) have spent not more than 2 years in the occupation.

The minimum age (in years) of the respondents was 19 and the maximum was 72 with the most frequent age being 35 while the median and the mean ages were 38 and 40 ± 13 respectively. The participants were all males because the occupations studied in this research are generally believed in Nigeria and in Africa to be for men only since they are considered to be hard and require a lot of energy.

Automobile spray painting and mechanical work are considered to be hard to do and are therefore meant for

youths and young adults. The age category reflects this believe as the highest number of the respondents was seen in age group 31 – 40 with 35 (33.3%), followed by 25 (23.8%) seen for age group 20 – 30. These age groups are considered to be young adult and youth age groups respectively. Above 60 and below 20 age groups recorded smallest values of 9 (8.6%) and 3 (2.9%) respectively as the age groups considered to be either too old or too young to be active in such hard occupations. This is in agreement with study conducted by Odhiambo and Manda that many children from informal settlement areas drop out of school at an early age to seek employment due to poverty [11].

Only 13 (26%) of 55 spray painters, 14 (25.5%) of mechanics and 27 (25.7%) of 105 (total) were aware of the ingredients of the chemicals they use. Just 18 (17.1%) of the 105 respondents of which 11 were mechanics and 7 spray painters knew the effects of the chemicals they use. This is in an agreement with the study conducted by Lansink [12]. This probably is due to proximity of spreader to spray painter's face (Breathing zone of spray painter).

Fifty percent (9) of those who believed they had the knowledge of the effects of these chemical components could not mention a particular effect while 6 (33.3%) believed they could result to cough. None of the respondents had any knowledge about aromatic solvents. Most 99 (94.3%) of the respondents of which 48 (96% of 50) were spray painters and 51 (92.7% of 55) admitted that they regularly inhale chemical while working while all respondents admitted regular chemical contact of their skin with effect on emission of paint onto the skin and outer clothing, this is line with study conducted by Lansink [12]. Yet, only 12 (11.4%) have ever done periodical medical checkup 10 of which were spray painters with only 2 mechanics. Fifty percent (6) of those who have engaged in periodic medical checkup had their checkups done within one year before interview while another 50% had theirs between 1 -3 years before the time of

interview. The p value for each of the tested parameter (>0.05) shows clearly that there is no significant difference in the knowledge of both the Automobile spray painter and the Mechanics.

Most 63 (60.0%) of the respondents defined personal protective equipment (PPE) as nose mask, 66% of spray painters and 54.5% of mechanics also called PPE nose mask. 27 (25.7%) believed that PPEs are either boots or gloves for protecting hands and legs, 12 (11.4%) called PPEs anything used to protect any part of the body while 3 (2.9%) defined it as what is used to prevent diseases. Only 45 (42.9%) of 105 respondents admitted wearing PPE while working, 63 (60%) admitted having catarrh or may have it. Among the 63 who had catarrh, 28 (26.7%) couldn't remember when it started, 7 (6.7%) said it started in less than a year, 3 (2.9%) for more than 10 years and 1 (1.0%) between 4 to 5 years before the interview while 24 (22.9%) were experiencing on and off catarrh. This is line with the study conducted by NIOSH., 1978 [9], Charles stated that Workers exposed to high concentrations of diisocyanates may result in what is called chemical bronchitis, chest tightness, nocturnal dyspnea (shortness of breath), pulmonary edema (fluid in the lungs) and reduced lung function[13]. It is also known that lung functions decrease with number of exposures [14]. Sensitization of isocyanate can happen even within days of exposure [15]. According to the study, the spray painters had multiple symptoms of the disease associated with spray painting.

However, there is no statistical significant difference in the knowledge of spray painters and mechanics about PPE as it can be generally rated poor ($<50\%$), $P>0.05$. The knowledge and perception of both spray painters and mechanics about occupational health hazards are generally low (below 20%). Their attitudes towards occupational health hazards are also rated very poor (below 30%) and safety measures are low for both. However, none of the two groups can be rated better than the other ($p>0.05$). Most respondents did not have formal education, so it is not surprised seeing that they recorded higher knowledge of the first three questions. Presence of disease symptoms associated with spray painting can be caused by many factors, both external such as poverty to political good will and other internal factors such as level of education, to lack of training in basics relevant skills in paint technology, lack of use of personal protective equipment and other infrastructures like enclosed buildings [11]. The study suggested that there is a significant difference in the knowledge, attitude, perception of spray painters and mechanics based on their level of education. This same effect is seen in safety measures ($p<0.05$).

5. Conclusion

The results from this study showed that knowledge of potential occupational hazards among automobile workers was generally low (below 20%). Equally their attitudes towards occupational health hazards are also rated very poor

(below 30%) and safety measures are low for both automobile workers used for this study. However, safety practice among automobile workers is poor irrespective of educational status or occupational category.

The population at risk of ill health effects of spray paint exposure was young people. It was observed that spray painters in the study were using little or no form of protection while engaged in spray painting activities and concluded that, this lack of protection was increasing exposure time (actual time in contact with auto paint), which increased the likelihood of contracting disease symptoms associated with spray painting. The study also revealed that spray painters in small scale informal auto garages in North Bank Mechanic village had poor health seeking behaviors. According to the study, they rarely consulted a health professional or visit health facilities when suffering from the diseases symptoms associated with spray painting activities.

Recommendations

1. There is need for regular training on safety guidelines and enforcement of standard/universal safety practices by automobile workers so as to reduce potential occupational hazards.
2. Automobile garages should provide appropriate equipment necessary for automobile workers to carry out their duties.
3. As a matter of fact, public awareness and preventive programs to be carried out in the workplaces where spray painting is done with supports of policy makers.
4. There should be a development of training manuals and programmes for spray painters and automobile mechanics and other operators in small scale garages so as to ensure some competence in the industry.
5. There should be a periodical monitoring and evaluation of health of all the workers in the auto garages and paint industries in Nigeria and other developing countries as these health hazards cuts across all the stages of manufacture, storage and handling, and end use of the auto paint and allied chemicals [16].
6. The policy makers should also organize social development by protecting the most vulnerable young people who are the majority in the industry and are integral part of the future intellectual, social and key to Nigeria largest economic in Africa by developing standards and other regulatory procedures for the industry

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