Investigation into Safety Practices by Automobile Body Sprayers in the Cape Coast Metropolitan Area

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ABSTRACT

Currently in the Cape Coast Metropolitan Area, compressed air spray gun is the device use to spray automobile bodies. This article intends to investigate the level of protection by these sprayers against the industrial hazards of the spraying.Spraying operation in the Metropolitan Area is manual, sometimes in ovens and sandpapers are used to prepare the bodies before spraying. The safety devices to be use are respirators, gloves, goggles, helmets, ear plugs, safety shoes and aprons. The uses of some protective devices are better whiles others need to be improved upon. The methodology involves administering of questionnaires and interviews.

Keywords: Sprayers, Safety, Sandpaper, Automobile, Fumes.

INTRODUCTION

Spraying of automobile body and some selected parts involves a painting technology using the device of air brush or spray gun, coating through the air onto the targeted surface. In the Cape Coast Metropolitan Area, the most common type of spray machine or equipment use is the compressed air gun type. Compressed air spray guns are the development of air brushes which were relatively smaller in size, suitable for smaller spray patterns such as photo retouching, painting nails and fine art. The operations of the spray guns involve atomization of the paint into fine particles for spraying. The spray guns are typically used for covering large surfaces with an even coating of paint. This spraying method can be automated or manually operated to allow for different spraying patterns. The objective of this article is to investigate into the method of

automobile body spraying and the effectiveness of the use of protective equipment against the hazards of spraying in the Cape Coast Metropolitan Area.

REVIEWED LITERATURE

Automobile body spraying in the Cape Coast Metropolitan Area

In the Cape Coast Metropolitan Area, automobile body spraying is the type of operation or process which occurs when a mixture of paints and solvents are applied on the automobile body by the use of air-pressurized spray gun. The basic components of this spraying equipment use in the Metropolitan Areaare:air compressor unit, paint basin, trigger, nozzle and adjusting screws. The common types of nozzles use by these sprayers are the full one nozzle, hollow cone nozzle and the flat stream nozzle. The fundamental factors responsible for these sprayers' choosing of nozzle are: the shape of the work, paint type and pattern of work. The nozzleisthe final channel through which the paint solutions come out to form a mixture of vapourized andatomizedfine particles. Thus, when these sprayers press the trigger, the paint mixes with the compressed air stream and flows out under high pressure to form fine spray onto the automobile body or the selected parts. The spraying operation in the Metropolitan Area is manual, thus the air-gun nozzle is held by a skilled operator (sprayer) at a distance of about 15cm from the automobile body to be sprayed. The movement of the nozzle during spraying is back and front over the targeted surface with each stroke overlapping the previous to ensure continuous coatings.Modern or improved method of automobile body spraying in the Metropolitan Area is the spraying in booths or ovens. These booths or ovens are pressurized, heated and air-controlled rooms in which vehicle body is sprayed. Thus these rooms are equipped with devices to regulate airflow, temperature, humidity,pressure among others for quality spraying as well as quick drying. Types of spraying that were not found in the Metropolitan Area during this research are: high volume-low pressure, electrostatic, airless, automated linear and automated flatting.

Automobile body preparation by the sprayers

Initially, these sprayers remove most of the parts of automobiles that must not be sprayed or to be sprayed with different colours. They also tape off areas that need not to be sprayed. The type of tape being use is the painters' grade husking that will not damage the finishing. These sprayers spend time using different types of sandpapers for smoothing the automobile body before spraying. Firstly, higher grit sandpapers are used for net-sanding of smoothing the body. Secondly, low grit sandpapers are used to smooth out the scratches on the body. Thirdly, the smooth automobile body is sprayed with primer to ensure more smoothness and quality. The fourth stage involves the use of high grit net sandpaper to smooth out any projections. Twenty four (24) hours after the primer spraying, the actual spraying is done sideways but not up and down. Re-spraying is done twenty (20) minutes after.

Dangers associated with spraying

Most of the paints use by these sprayers in the Metropolitan Area contains toxic components such as isocyanate and its continuous breathing by the sprayers may cause asthma.

Symptoms of asthma include:

Breathlessness

Persistent coughing

Watering eyes

Running/ blocked nose

Chest tightness

Wheezing

Symptoms of the effects of paints and solvents on the sprayers' body are:

Itching

Rashes

Skin cracking or peeling

Skin redness or soreness

Sprayers in the Metropolitan Area must adapt the following measures to prevent or eliminate isocyanate breathing:

Wear appropriate personal protective equipment (respirators)

Follow lay down working procedures.

Booths or Ovens must be properly design and equip.

Regular medical check–ups.

Also, irritations of eyes, nose, throat as well as mild reversible effects on the human body are some of the health risk these sprayers will encounter if appropriate safety measures are not adhered to. These sprayers must providerestricted rooms for storage of paints and other inflammable solvents. There must also be fire extinguishers at designated points.

Ventilation

Fumes of microscopic sizes of toxic paint solutions may circulate in the spraying environment resulting to the above mention sicknesses. Therefore sprayers in the Metropolitan Area must spray in well ventilated booths or ovens fitted with filters, circulating and suction devices.

Respiration Protection

During spraying, these sprayers must put on air-fed respirators in order not to breathe in toxic fumes. In order to have proper functioning of respirators, the compressors must deliver enough clean air into the spraying environment. Also, the sprayers must frequently check the airlines, filters as well as traps for theirproper functioning. Respirators are plastic devices that cover the nose and extend to the back of the neck with filters at the nose.

Gloves

The gloves that these sprayers must wear during spraying are split or tough leather type derived from the hide of cow, dear, elk, goat or swine. The gloves must provide comfort, sensitivity and must be of all sizes. These gloves must be moisture resistant, dust resistant, brightly coloured, resistant to electric shock, heat resistant, thick, as well as prevents tear, cut, scrape and puncture.

Protection of eyes

Paint and solvent fumes cause eye irritation as well as permanent damage to the eyes. Therefore, sprayers in the Metropolitan Area must put on tinted glasses, safety glasses or goggles with side shields. They must also keep the floor of the booths or ovens tidy always to avoid accidents.

Other personal protective equipment

The sprayers must wear dull black coloured helmets made of pressed fiber insulating material. They must wear tough leather shoes made of mesh fabric. The shoes must have high density rubber soles. The shoes must alsobe fluid resistant, antislip, durable, electric shock resistant and made of steel caps at the toes.

Ear plugs which are dual sided must be put on to protect the ears but allows them to hear conversations without impairment. They must also wear liquid proof aprons or jackets made of tough leather which is chemically treated to prevent combustion.

METHODOLOGY

This research covers all automobile body sprayers in the Cape Coast Metropolitan Area. This Metropolitan Area was chosen for the research because it has the largest number of sprayers in the Central Region. This methodology involves administering of (16) sixteen questionnaires and interviews to these sprayers, resulting to obtaining qualitative and quantitative data. Analysis of graphs from this data hasproduced sufficient evidence to substantiate the conclusion and

recommendations. This data collection and analysis was the best means of achieving the goals of this research. There was maximum co-operation from the target group, thus automobile body sprayers in the Cape Coast Metropolitan Area.

TABLE 1

SPRAYER SHOP MASTER'S NAME	EDUCATIONAL LEVEL OF THE SPRAYERS	METHOD OF MINING	METHOD OF CLEANING PAINT ON AUTOMOBILE
NANA KUM KRANKSON	J.H.S	BY MACHINE	BY GRINDING MACHINE
FRANCIS COBBINA	J.H.S	BY MACHINE	BY HAND
KWESI DARKWA	-	BY MACHINE	BY HAND
MASTER MUSA	J.H.S	BY MACHINE	BY HAND
KOFI ACQUAH	J.H.S	BY MACHINE	BY GRINDING MACHINE
MASTER AIBOY	S.H.S	BY MACHINE	BY HAND
JOHN CUDJOE	J.H.S	BY MACHINE	BY GRINDING MACHINE
EBENEZER ANKOMAH	S.H.S	BY HAND AND MACHINE	BY HAND
MASTER KWEME	S.H.S	BY HAND	BY GRINDING MACHINE
MASTER EMMANUEL	J.H.S	BY MACHINE	BY HAND
MASTER EKOW KOOMSON	J.H.S	BY MACHINE	BY HAND
MASTER KOJO ANDOH	FROM FOUR	BY HAND	BY HAND
MASTER ANNAN	J.H.S	BY MACHINE	BY HAND
ERIC ASARE	J.H.S	BY MACHINE	BY GRINDING MACHINE
STEPHEN DONKOH	J.H.S	BY MACHINE	BY GRINDING MACHINE
KOBINA ATTA MENSAH	-	BY MACHINE	BY HAND

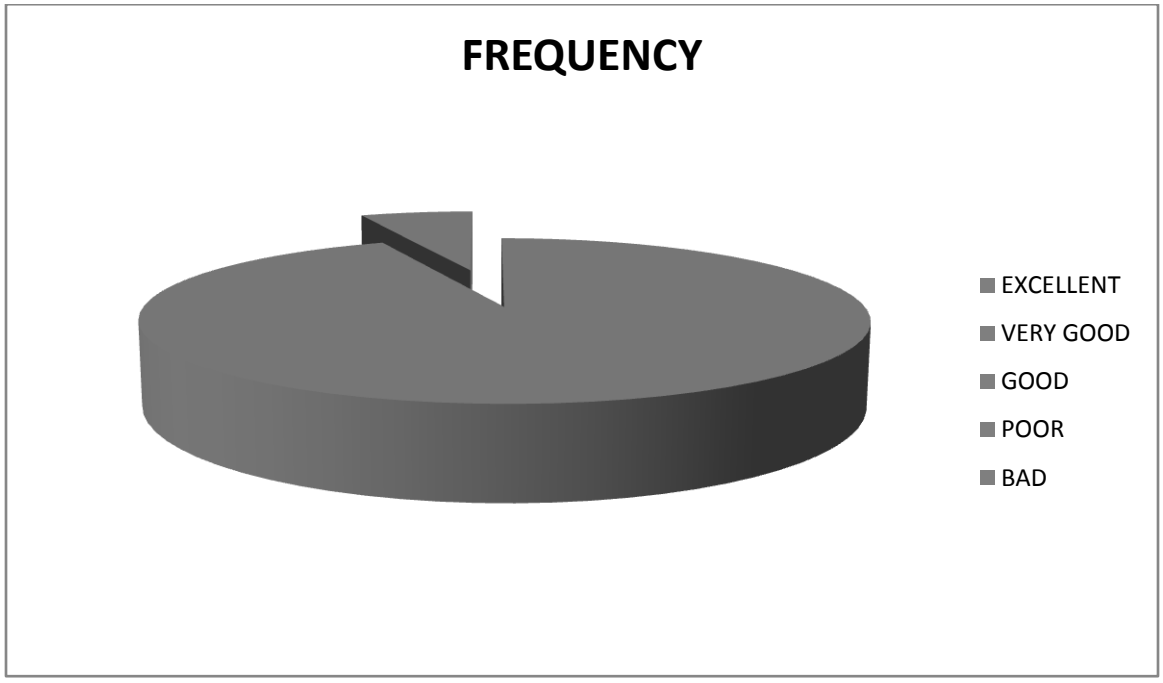
SOURCE: AUTHOR'S FIELD WORK 2013

TABLE 2

	RESPONDS	FREQUENCY	PERCENTAGE
AVAILABILITY AND USAGE OF NOSE FILTERS	EXCELLENT	= 15	$\frac{15}{16} \times 100 = 93.75$
	VERY GOOD	= 1	$\frac{1}{16} \times 100 = 6.25$
	GOOD	0	0
	POOR	0	0
	BAD	0	0
TOTAL		**16**	**100**

SOURCE: AUTHOR'S FIELD WORK 2013

FIGURE 2



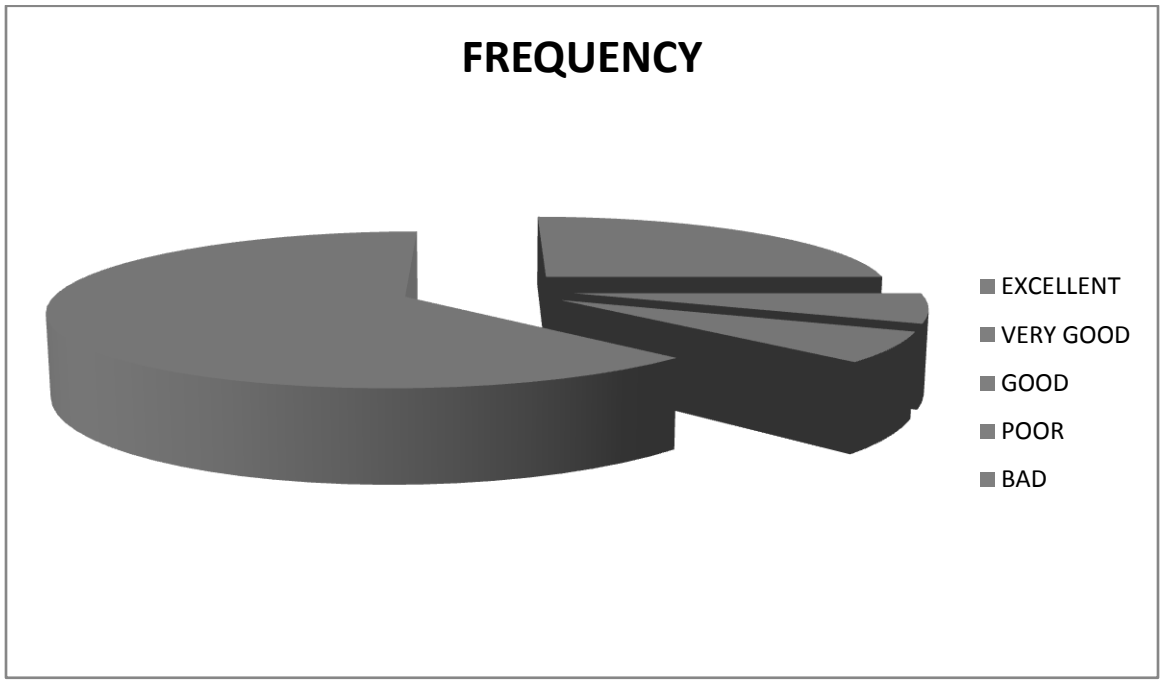
SOURCE: AUTHOR'S FIELD WORK 2013

TABLE 3

	RESPONDS	FREQUENCY	PERCENTAGE
AVAILABILITY AND USAGE OF GOGGLES	EXCELLENT	|||| = 4	$\frac{4}{16} \times 100 = 25.00$
	VERY GOOD	| = 1	$\frac{1}{16} \times 100 = 6.25$
	GOOD	= 1 |	$\frac{1}{16} \times 100 = 6.25$
	POOR	𝍸 𝍸 10	$\frac{10}{16} \times 100 = 62.50$
	BAD	0	0
TOTAL		**16**	**100**

SOURCE: AUTHOR'S FIELD WORK 2013

FIGURE 3



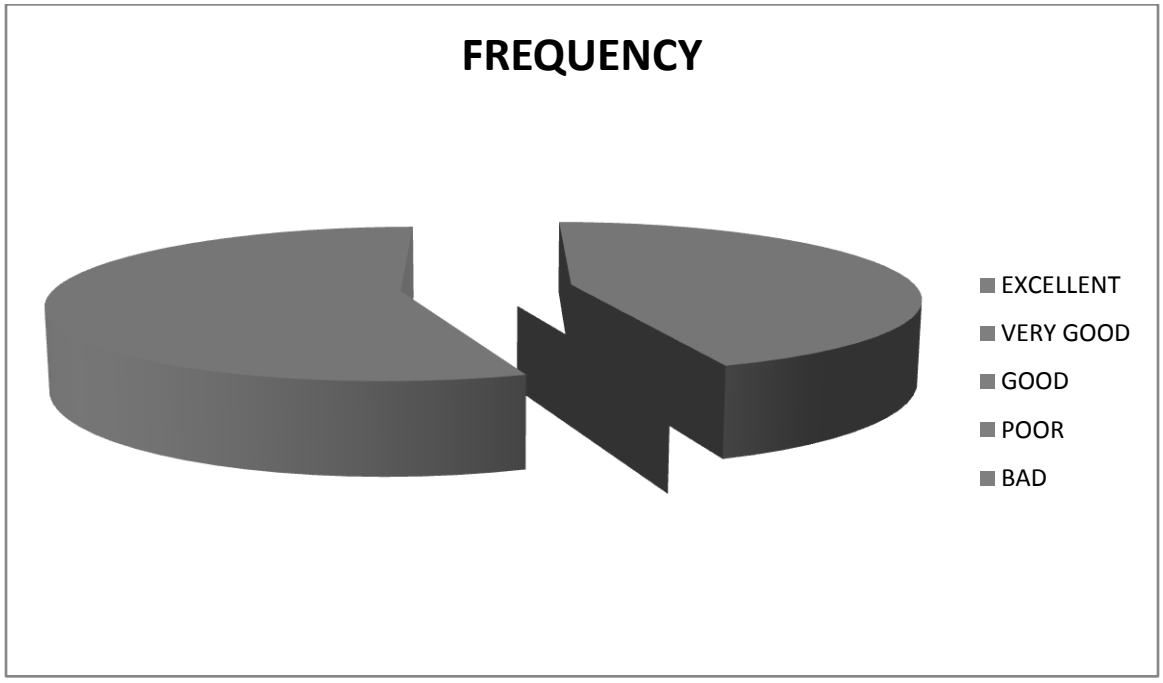
SOURCE: AUTHOR'S FIELD WORK 2013

TABLE 4

	RESPONDS	FREQUENCY	PERCENTAGE
AVAILABILITY AND USAGE OF HAND GROVES	EXCELLENT	𝍸 = 4	$\frac{4}{16} \times 100 = 25$
	VERY GOOD	0	0
	GOOD	= 5	$\frac{5}{16} \times 100 = 31.25$
	POOR	𝍸 || = 7	$\frac{7}{16} \times 100 = 43.75$
	BAD	0	0
TOTAL		**16**	**100**

SOURCE: AUTHOR'S FIELD WORK 2013

FIGURE 4



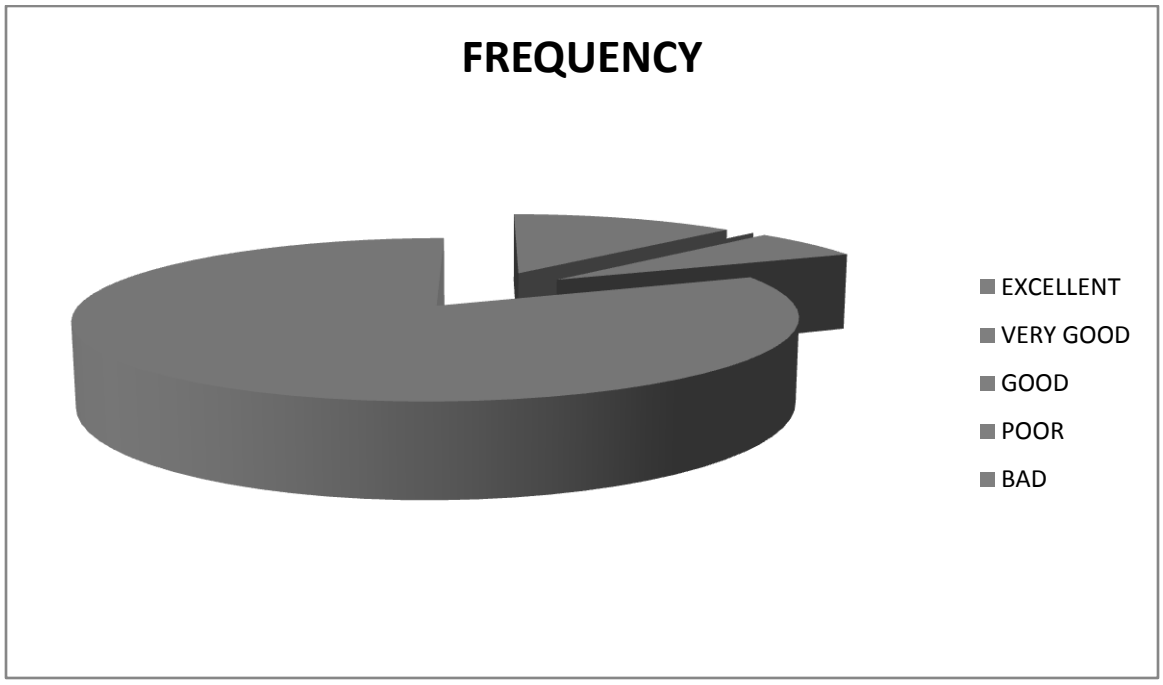
SOURCE: AUTHOR'S FIELD WORK 2013

TABLE 5

	RESPONDS	FREQUENCY	PERCENTAGE
AVAILABILITY AND USAGE OF HELMENT	EXCELLENT	|| = 2	$\frac{2}{16} \times 100 = 12.50$
	VERY GOOD	0	0
	GOOD	= 1 |	$\frac{1}{16} \times 100 = 6.25$
	POOR	𝍸 ||| = 13	$\frac{18}{16} \times 100 = 81.25$
	BAD	0	0
TOTAL		**16**	**100**

SOURCE: AUTHOR'S FIELD WORK 2013

FIGURE 5



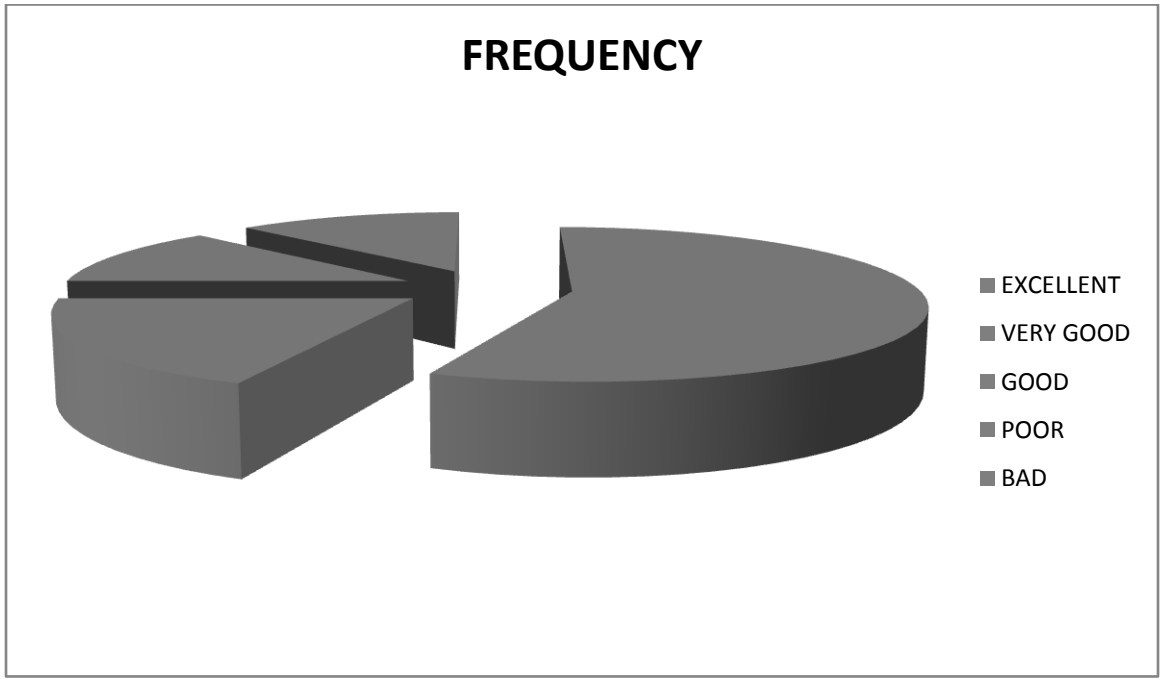
SOURCE: AUTHOR'S FIELD WORK 2013

TABLE 6

	RESPONDS	FREQUENCY	PERCENTAGE
AVAILABILITY AND USAGE OF PROPER ENCLOSED OVENS	EXCELLENT	𝍸 = 9	$\frac{9}{16} \times 100 = 56.25$
	VERY GOOD	𝍷 = 3	$\frac{3}{16} \times 100 = 18.75$
	GOOD	𝍶 = 2	$\frac{2}{16} \times 100 = 12.50$
	POOR	𝍶 = 2	$\frac{2}{16} \times 100 = 12.50$
	BAD	0	0
TOTAL		**16**	**100**

SOURCE: AUTHOR'S FIELD WORK 2013

FIGURE 6



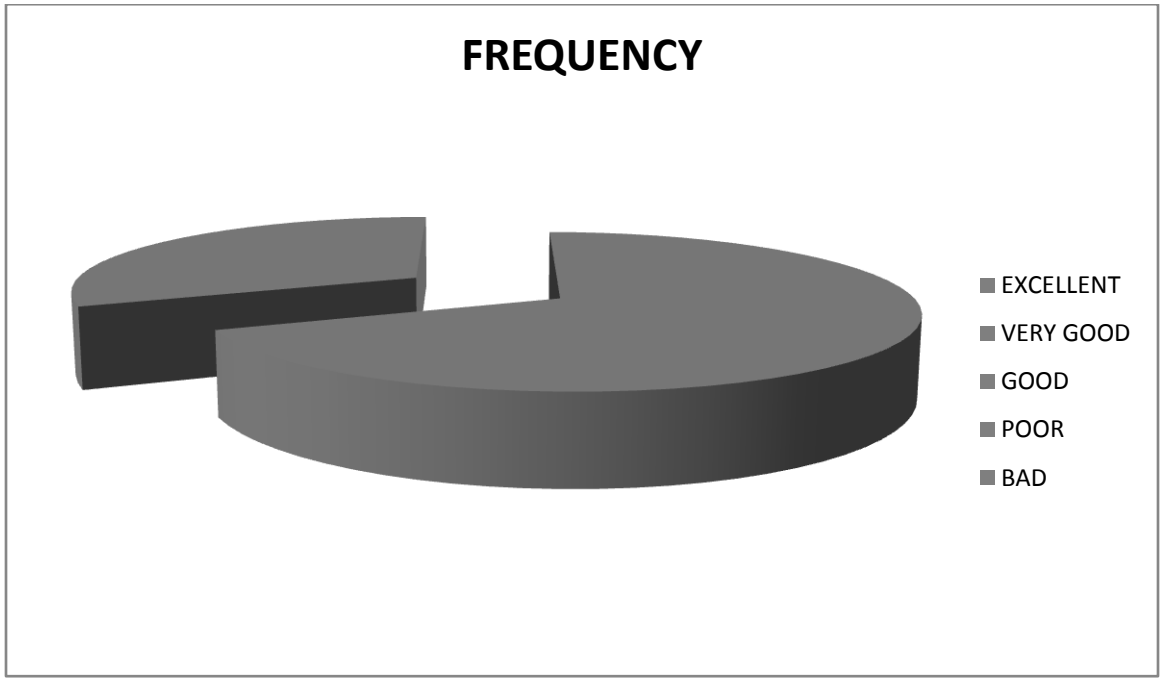
SOURCE: AUTHOR'S FIELD WORK 2013

TABLE 7

	RESPONDS	FREQUENCY	PERCENTAGE
QUALITY OF PAINTS OFTEN USE	EXCELLENT	𝍸 𝍸 | = 11	$\frac{11}{16} \times 100 = 68.75$
	VERY GOOD	𝍸 = 5	$\frac{5}{16} \times 100 = 31.25$
	GOOD	0	0
	POOR	0	0
	BAD	0	0
TOTAL		**16**	**100**

SOURCE: AUTHOR'S FIELD WORK 2013

FIGURE 7



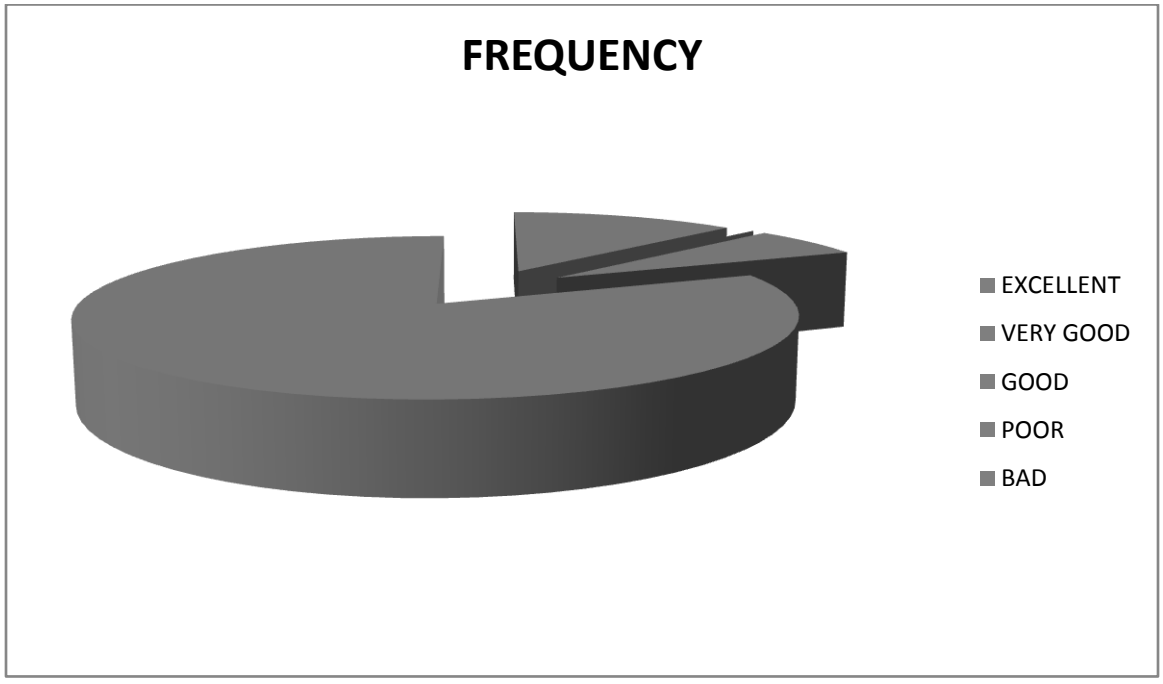
SOURCE: AUTHOR'S FIELD WORK 2013

TABLE 8

	RESPONDS	FREQUENCY	PERCENTAGE
AVAILABILITY AND USAGE OF APRONS	EXCELLENT	𝍸 | = 6	$\frac{6}{16} \times 100 = 37.50$
	VERY GOOD	||| = 3	$\frac{3}{16} \times 100 = 18.75$
	GOOD	𝍸 | = 6	$\frac{6}{16} \times 100 = 37.50$
	POOR	| = 1	$\frac{1}{16} \times 100 = 6.25$
	BAD	0	0
TOTAL		**16**	**100**

SOURCE: AUTHOR'S FIELD WORK 2013

FIGURE 8



SOURCE: AUTHOR'S FIELD WORK 2013

DISCUSSIONS

There are (10) ten sprayers who have attain Junior High School education out of the (16)sixteen sprayers covered in the Cape Coast Metropolitan Area, with reference to table 1. Sprayers who have Senior High School education are (3) three, (1) one sprayer has obtainedMiddle School Leaving Certificate whiles (2) two of the sprayers have no formal education. According to table 1, all these sprayers mix their paints with machines. In table 1, (6) six of the sprayers use sandpapers on grinding machines for preparing or cleaning the automobile body before spraying, whiles (10) ten of these sprayers use the sandpapers in their hands for preparing the automobile body. Table 2 reveals that availability and usage of nose filters have 93.75% excellent, 6.25% very good, 0% for good, poor and bad each. Availability and usage of goggles in table 3 have 25.00% excellent, 62.50% poor, 0% bad, 6.25% very good and good each. Availability and usage of hand gloves in table 4 shows 25.00% excellent, 31.25% good, 43.75% poor, 0% for both very good and bad. Table 5 indicates that availability and usage of helmet have 12.50% excellent, 6.25% good, 81.25% poor, 0% very good and bad each. In table 6, there is 56.25% excellent, 18.75% very good, 0% bad, 12.50% good and poor each for availability and usage of proper enclosed ovens. Table 7 shows that quality of paints often used have 68.75% excellent, 31.25% very good, 0% good, poor and bad each. Table 8 shows that availability and usage of aprons score 37.50% excellent, 18.75% very good, 37.50% good, 6.25% poor and 0% bad.

CONCLUSION

This research indicates clearly that the educational level of the sprayers in the Cape Coast Metropolitan Area is relatively better whiles enough machines are not available for automobile body preparation. These sprayers protect themselves very well from breathing of paint fumes. Approximately half of these sprayers do not use goggles or protective glasses and gloves during spraying. A large number of them do not use helmets whiles most of them do the spraying in booths and ovens. In the Metropolitan Area, high grade quality paints are use, usage and availability of aprons was average.

RECOMMENDATIONS

The following recommendations were made:

- The sprayers must use grinding machines instead of hand for automobile body preparation despite the cost of electricity consumption. This will make the work faster and more quality.
- These sprayers must be encouraged to use protective goggles or glasses, gloves, helmets and aprons.
- There must be intensive education on general safety for these sprayers.
- These sprayers must also be train on environmental and hygienic practices.
- There must be a research on the health conditions of the sprayers.

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