

Data analysis of farm accident through agricultural mechanization

¹Adewumi Idowu Olugbenga, ²Ijadunola John Ademola, ³Aremu David.O, ⁴Oladejo Lukuman Folarin

^{1,2,3} Department of Agricultural Engineering, Federal College of Agriculture, Ibadan, Nigeria.

⁴ Department of Agriculture, Federal College of Agriculture, Ibadan, Nigeria.

Abstract

Farm accident occurrence has been a serious issue in agricultural sector of the nation. This is just because most operation carried out on farm are tedious, energy and time consuming. These thesis majorly focus on data analysis of accidents with machinery and devices in agriculture. Three different local governments in Oyo-state were considered, Egbeda, Ona-ara and Ido local government respectively. Primary data were collected through interview and questionnaire approach, while secondary data are from journals, bulletins, and internet were employed in the study, where 150 respondents were involved in this findings. In order to allow intensity of perception as expressed by respondent participation, 4-point scale was used in the questionnaire design. This aspect of the research work explores deeply the socio-economic characteristic of the respondent [independent variables] on the perception of respondents' on effect of mechanization in agriculture to increase in farm accident rate [dependent variable]. The relationship was tested using regression analysis. The end result shows that low academic qualification of the respondent is one of the main causes of accident when using farm machinery and devices. It is also concluded that working age for agricultural farm worker that handles device and machinery should range between 18 – 29 years and 30 – 39 years according to the data collected from the study area. Statistical result indicated that there is a great need for government intervention in reduction in farm accidents through use of device and machinery.

Keywords: Mechanization, Farm accident, data analysis, regression

1. Introduction

Farming is one of the most dangerous occupations in Nigeria and involves exposure to a variety of hazards including unguarded machinery, animals, noise, dusts and airborne toxins, compressed air, and temperature extremes (Pinkett W, 1995). While considerable attention has been devoted to modifying this environment in order to improve safety, newer agricultural practices have also introduced risks. Examples include spinal column fractures caused by large round bales, the physical risks associated with intensive livestock operations, acute poisoning and other toxicological effects of agrochemicals, oxygen deficient atmospheres or toxic gases, and contact with electrical devices and a wide variety of ergonomic hazards.

Mechanization has meant great improvements in farming over the years, but there is a negative side to the tractors and machinery that make farming so efficient. Each year there are injuries and fatalities among those who work with or near farm machinery. It is paramount to note that there are more accidental deaths in agriculture than any other major industries (Jain and Rai, 1999). It is noted that farm mechanization activities are the sources of majority of an accidents or injuries happened in farming processes, which usually result to loss of lives, money consuming and time wastage.

Tools, implements, and powered machinery are essential and major inputs to agriculture. The term mechanization is generally used as an overall description of the application of these inputs (Clarke, 2000). The level, appropriate choice and subsequent proper use of mechanized inputs into agriculture has a direct and significant effect on achievable levels of land productivity, labor productivity, the profitability of farming, the

sustainability, the environment and, on the quality of life of people engaged in agriculture.

Starkey (1998) defined farm mechanization as the development and introduction of mechanized assistance of all forms and at any level of sophistication in agricultural production to improve efficiency of human time and labor. The present state of mechanization in Nigeria agriculture is still far from increasing the rate of farming earnings and productivity. This is because mechanization plan has not been formulated following a well-designed, reliable and thorough analysis (Nwoko, 1990). Tropical agricultural mechanization involves the use of tools, implements and machines to improve the efficiency of human time and labor. The most appropriate machinery and power source for any operation depends on the work to be done, cultural settings, affordability, availability and technical efficiency of the options. These indications were clearly evident that agricultural mechanization is not an end in itself, but a means of development that must be sustained.

Therefore a socially beneficial agricultural production is determined based on a wide range of social, economic and ecological factors. These factors determine whether a technology is practicable, beneficial, or sustainable in an area. The agrarian structure of Nigerian agriculture has failed to make adequate contributions to the nation's economic development (Mrema and Odigboh, 1993).

This failure of agricultural industry especially in farm settlement schemes can be attributed to the absence of an appropriate level of agricultural mechanization.

Anozodo *et al.*, (1986) observed that the application of human, animal and mechanical equipments in agriculture with reference to technical, socio-economic and cultural constraints of farm can be acknowledged in the continuing official

promotion of primitive hand tool technology characterized by low production efficiency. FAO (1981) affirmed that Nigeria as a nation from the first decade of the country's independence in 1960 had experienced failure in improving the farm mechanization through various agricultural policies that were implemented.

Ou *et al.* (2002) reported that agricultural mechanization as system engineering requires not only advances in machine development and applications but also the close cooperation of many sections. In recognition of this fact, certain environmental, agricultural, social and economic conditions must be ascertained to favour investments in mechanization technologies and their sustainable use. Timeliness of tillage and planting, weeding and/or harvesting are critical factors where affordable labour is insufficient to permit timely operation. Other key factors that influence successful mechanization include Socio-economic factors, supporting infrastructure, land and other agro-ecological conditions, technical skills and service (Olaoye, 2007).

The World Health Organization defines health surveillance as the ongoing and systematic collection, analysis, interpretation, and dissemination of health information. Injury surveillance is an important prevention activity in that it allows researchers to estimate the magnitude of injury related morbidity and mortality; detect new injury problems and changes in the occurrence of injury; and identify potential risk factors. Data generated through surveillance initiatives provide a factual basis for the evaluation of intervention strategies, and for the development of rational public policies.

2. Methodology

2.1 The issue of research methodology is central to the collection and analysis of evidence in an empirical study. This research provides an overview of the research framework adopted in analyzing the accidents with machinery and devices in agriculture, which includes research design, population and sample, research instrument, validation with reliability of the instrument, research procedure and method of statistical analysis.

Steps involved in conducting the case study and gathering data through questionnaire, interviews and documentation are highlighted in this chapter. The techniques for analyzing and interpretation were presented.

2.2 Research Procedure

The data for this study was generated from two main sources; primary data and secondary data

- a) **Primary data:** Primary data will be collected with the aid of an interview guide in obtaining opinion and response from the intending target audience. Data included in the interview guide are those on the socio-economic characteristics, effect of farm accident on agriculture in Nigeria, perception of respondents on causes of farm accident, and perception of respondents towards farm accident prevention in Nigeria.
- b) **Secondary data:** The secondary data collected includes data obtainable from recent Journals, Bulletins, National Office of Statistics and information's from the Internet.

2.3 Population and Sample

The sampling procedure used for the purpose of this study is a multistage sampling technique. Three different local

governments in Ibadan were involved in the analysis, which include Egbeda, Ona-ara and Ido local government respectively, followed by the selection of 50 respondents from each local government area. This makes total of 150 respondents in all, using the simple random sampling procedure for the study.

2.4 Research Instrument / Instrumentation

A combination of direct observation, structured questionnaire / interview guide and oral interview will be used for primary data collection by field enumerator and the project student.

The 4-point scale was preferred in the study for this section because it allows for the intensity of perception as expressed by respondent participation. Respondents could "strongly agree or agree or disagree or strongly disagree". The respondents will be required to simply tick (√) on the opinion which best satisfied their response.

Also, the research questionnaire will be classified into four different sections as follows:

Section A; socioeconomic characteristics of respondent in the study

Section B; Effect of farm accident on agriculture in Nigeria

Section C; Perception of respondents' on causes of farm accident in Nigeria

Section D; Perception of respondents towards farm accident prevention in Nigeria

2.5 Research Questions and Hypotheses

In view of the above stated problems, however this study seeks to provide findings to the following questions:

1. What is the attitude and perception of respondents towards the effect of farm accident on agriculture in Nigeria?
2. What are the main causes of farm accident?
3. What are the proposed measures of control or prevention of farm accident?

The following hypotheses are to be tested at 5% significance level

Hypothesis I

Ho 1: Socioeconomic status of the respondents has no significant effect on effect of farm accident.

Ha 1: Socioeconomic status of the respondents has a significant effect on effect on effect of farm accident.

Hypothesis II

Ho 2: Mechanization has no significant effect on the attitude of respondents towards the major causes of farm accident in Nigeria.

Ha 2: Mechanization has significant effect on the attitude of respondents towards the major causes of farm accident in Nigeria.

2.6 Method of Statistical Analysis

The data to be collected through the questionnaire will be coded and analyzed using the sample Mean, Frequency, Percentage and figures on demographic variables descriptively. Furthermore, this aspect of the research work explores deeply the socio-economic characteristic of the respondent [independent variables] on the perception of respondents' on effect of mechanization in agriculture to increase in farm accident rate [dependent variable]. The relationship will be tested using regression analysis.

The lead equation becomes

$$Y = C_0 + C_1X_1 + C_2 X_2 + C_3 X_3 + C_4 X_4 + C_5 X_5 + \dots + C_n X_n + \mu \text{ [Linear Equation]}$$

Where the dependent variable Y is the Rate of criminal involvement and the independent variable $X_1 - X_7$ with $C_1 - C_7$ as their corresponding coefficient are:

C_0 = Constant

Y = Effect of mechanization in agriculture on farm accident

X_1 = Sex

X_2 = Age

X_3 = Marital Status

X_4 = Academic Qualification

X_5 = Income per month

X_6 = Religion practiced

X_7 = Ethnic group

μ = error term

3. Results and discussion

This chapter presents the result of the study and the implication of such findings causes of farm accident through mechanization in Oyo- State.

3.1 Socio-economic characteristics of the respondents

This comprises the personal attributes of the respondents and their relationships to the environment such as their sex, age, marital status, nativity status, academic qualification, income (per month), ethnic group, and household size. Table 4.1 below present the distribution of the respondents with respect to these factors.

The findings show that 150 responses were collected and 46% and 44% of the respondents were below 29 years and 30 – 39 years respectively. This percentage indicates the highest number of respondents which implies that the majority of the respondents were within their economically active age category (Food and Agriculture Organization FAO, 1999). There is a possibility that this age group affected the ample knowledge of the farm accident investigation. This was possible due to the fact that the highest respondents in the study are the active and economical individuals, that were fully energetic to carry out farm operations.

This implies that age is a factor that is synonymous with the contribution and the understanding of work force involved in agricultural production consequently affected by farm accidents.

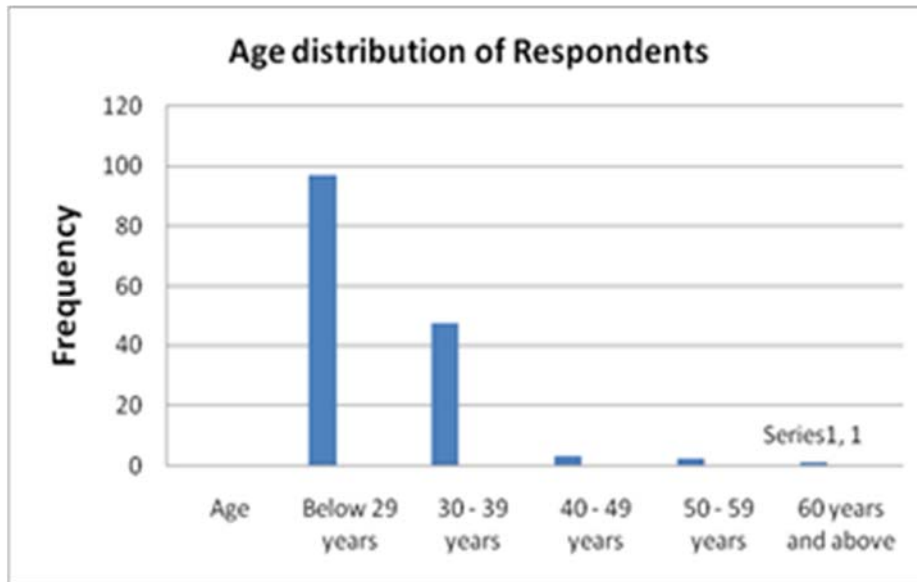


Fig 1: Chart showing the age distribution of respondents

For gender, the findings show that 150 responses were collated and 61.3% of the respondents were male and 38.7% were female. This simply means that male are more involved in agricultural practices and production than female in Oyo-State. Invariably, this will also indicate that male will be more expose to farm accident than female as they are the larger percent of respondent carrying out farm work.

For marital status, 150 responses were collated and 48.7% of the respondents were married, 42.0% were single, 8.0% were divorced and 1.3% were either widows or widowers.

For educational status, 7.3% of the respondents had little or no educational level, 4.7% had primary school certificate, 31.3% had secondary school certificate, 29.3% had A level/ NCE, 21.3% had ND/HND, 4.7% university graduate and 1.3% had above B.Sc education. The educational qualification of respondents revealed that there is a low level of understanding on the on safety when working with mechanized equipment or implement on farm.

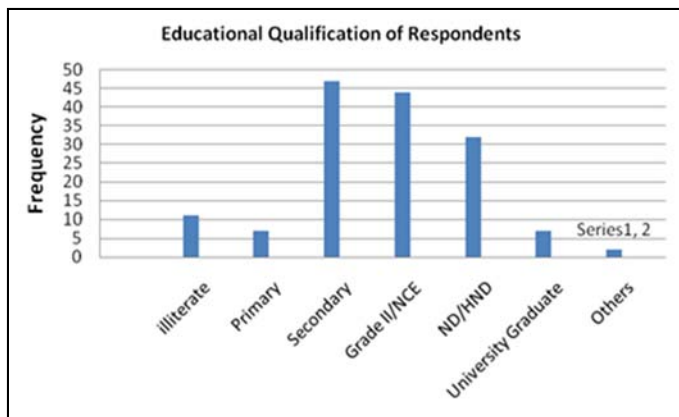


Fig 2: Chart showing educational qualification of the respondents

For their monthly income, 33.3% of the respondents fall in the category of those who earned below N9000 per month, while 36.7% fall between N9, 000 to 30,000 Naira, 9.3% fall between N31,000 to N90,000 while 19.3% for N91,000 to N180,000 and 1.3% fell above N181,000. This indicates that only smaller percent of the study population are those who earned standard pay. This is an indication that high level of farm accident and injuries are due to low wages and salaries or income of the farmers, since they cannot afford standard medical care.

For the ethnic group since the larger percent of our respondent has been an indigene of Oyo - State, 70.0% of the respondent are from Yoruba, 6.7% Hausa, while 23.3% are from Igbo.

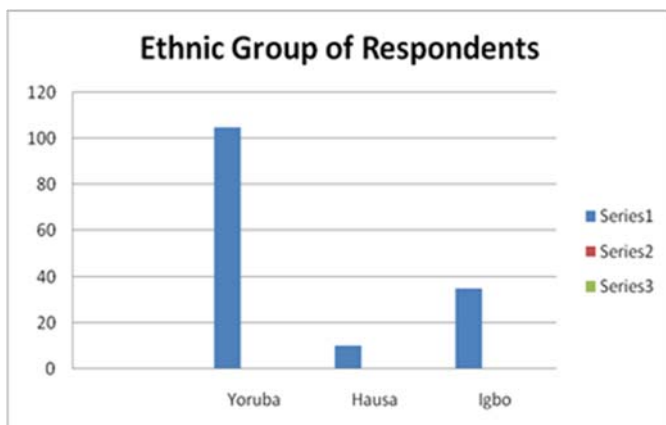


Fig 3: Chart showing ethnic group of the respondents

For their nativity status, the findings revealed that from the 150 responses that were collated 90% of the respondent populations are native of Oyo state while the rest 10% are of other nativity as shown in the Table 1.

Household size of the respondents shows that 14% had 1 – 5 children, 44.7% had 6 – 10 children, 33.3% had 11 – 15 children while only 8% had 16 children and above. In relation to the monthly income of the respondents, it has been clearly showed that farmers will not be able to pay proper attention to safety equipment and procedure as they are unable to afford them, due to financial constraints.

Table 3.1: Socio-Economic Characteristics (n = 150)

PARAMETERS	FREQUENCY	PERCENTAGE
SEX		
Male	92	61.3
Female	58	38.7
AGE		
Below 29 years	97	64.7
30 – 39 years	47	31.3
40 – 49 years	3	2.0
50 – 59 years	2	1.3
60 years and above	1	0.7
MARITAL STATUS		
Married	73	48.7
Single	63	17.8
Divorced	12	8.0
Widow/Widower	2	1.3
EDUCATIONAL STATUS		
Illiterate	11	7.3
Primary	7	4.7
Secondary	47	31.3
Grade II/NCE	44	31.3
ND/HND	32	21.3
University Graduate	7	4.7
Above Degree	2	1.3
Monthly Income		
Below N95000	50	33.3
N 9000 – N 30,000	55	36.7
N 31,000 – N 90,000	14	9.3
N91,000 - N180,000	29	19.3
N180,000 above	2	1.3
RELIGION		
Christianity	91	60.7
Islam	42	28.0
Traditional	17	11.3
NATIVITY STATUS		
Indigene	135	90.0
Non - Indigene	15	10.0

Source: Field Survey 2011

3.2 Effect of farm accident on agriculture in Nigeria

On the very high side, it has been showed from the population study, that reduction in farm income, farm mechanization, high workers compensation, inadequate infrastructure and high insurance premium with respective percentages of 46.0%, 34.0%, 46.0%, 31.3%, 35.3%, 50.0% and 26.7% are strongly agree to be part of the major negative effect of farm accidents and injuries in the study area.

Reduction in farm workers is the only factor that is strongly disagrees at a very high side from the respondent with a percentage of 38.7%.

Table 3.2: Effect of farm accident on agriculture (n = 150)

	Strongly Agree		Agree		Disagree		Strongly Disagree	
	Freq	%	Freq	%	Freq	%	Freq	%
Reduction in farm workers	65	43.3	18	12.0	9	6.0	58	38.7
Farmers income reduction	69	46.0	54	36.0	23	15.3	4	2.7
Farm mechanization	51	34.0	72	48.0	18	12.0	9	6.0
High workers compensation	69	46.0	56	37.3	21	14.0	4	2.7
Inadequate infrastructure	47	31.3	85	56.7	14	9.3	4	2.7
Reduction in farm produce yield	53	35.3	76	50.7	18	12.0	3	2.0
High insurance premium	75	50.0	60	40.0	12	8.0	3	2.0
Delay in farm work	40	26.7	76	50.7	34	22.7	-	-
Additional wages for worker	56	37.3	59	39.3	21	14.0	14	9.3

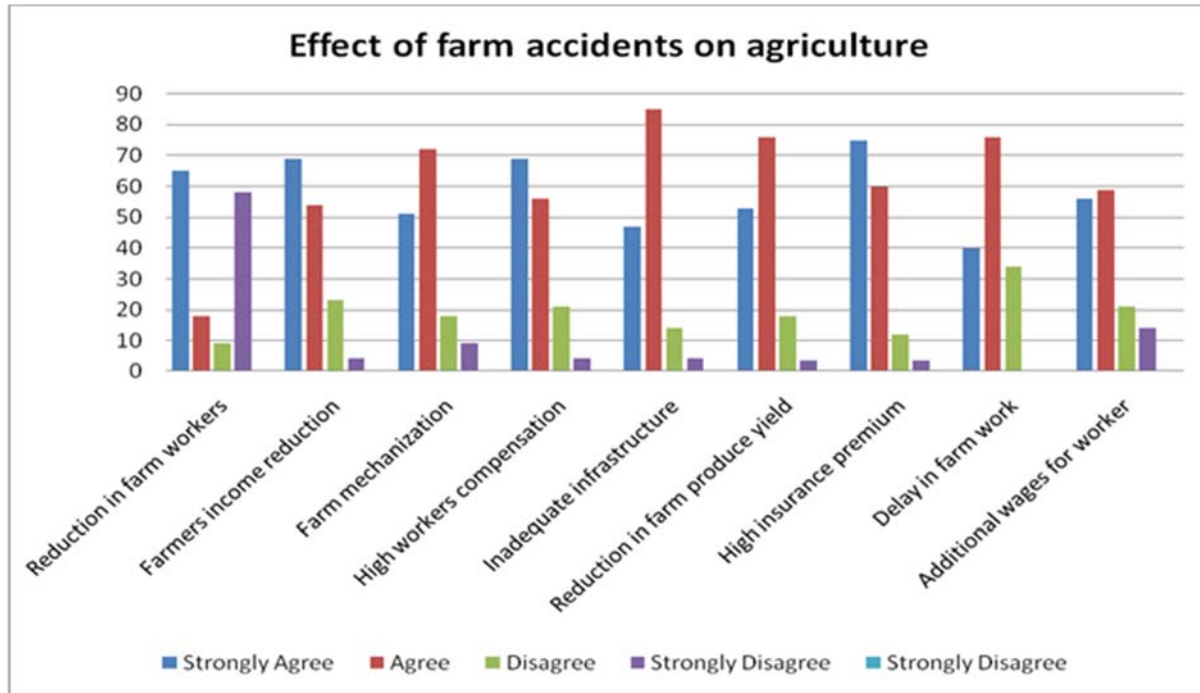


Fig 4: Chart showing the effect of farm accident in agriculture by the respondents

3.3 Summary of Regression Result

Because the ‘best fit’ model was to be considered a selection criteria, such as Model F value, R-square and the significance of the regression coefficients.

The F-value was 1.351, which was significant at 5% level i.e the socio-economic variables actually had an effect on farm accident and injuries in the study area.

The R-SQUARE value was 0.080 and was the highest of the three equation which means that the model (age, marital status, gender e.t.c) has accounted for 8% of the variance in the dependent variable.

Considering the impact of each predictor variable, on the criterion variable (farm accident effect in mechanized agriculture), the following findings were deduced.

The respondents’ age, educational level, ethnic group and nativity status were positively related to the farm accident effect in mechanized agriculture and they are significant at 7.4%, 1.3%, 0.3% and 1.1% level respectively. This indicates that the higher the educational level of the respondent, the higher will be their corresponding safety guidelines that will be followed during farm operations. This analysis shows that there will be occurrence of more accident on farm if older age are involve in farming operation especially on mechanized farming. Also in

terms of the ethnic group (Yoruba, Hausa and Igbo) any of the group that does not have a formal education or exposure to safety practices on farm will be greatly involved in farm accident.

Table 3.5: Regression Analysis

Model	Linear	
	B	T
(Constant)	109023.5	1.197
Age	0.068	0.793**
Sex	0.038	0.446
Marital status	-0.067	-0.794
Academic qualification	-0.093	-0.995*
Income per month	-0.129	-1.521
Religion	-0.136	-1.517
F		
Sig.	0.216	
R Square	0.080	
Std. Error of the Estimate	0.82474	
Ethnic group	-0.093	-0.995*
Household size	-0.129	-1.521
Nativity status	-0.136	-1.517*

Significance = *

More significance = **

4. Conclusion

It can be concluded that only trained expert must be handling machinery and devices on farm operation because this study analysis have clearly showed that larger percentage of accident occurs on farm due to lack of technical know-how. This however has a highly unfavorable effect on the agricultural produce availability, which can be a great reduction in income of farmers and the country at large.

Probably extinction in the availability of man power and infrastructure in this area will be reduced because of high rate of accident occurrence in the study area.

5. Recommendation

The following measures are recommended to solve the problem of farm accident using machinery and devices in agriculture.

- A structured orientation campaign should be launched to create a better understanding of machinery and device safety for farmers especially in the rural settlement.
- Government should make policies to support the training of skilled and unskilled labor in the agricultural sector, for handling machinery and devices.
- Technocrat in agricultural industry should make sure that each machinery and devices are operated by an expert in the field.
- Standard National Health Insurance policies must be made for agricultural worker, since farm workers are more exposed to accidents and injuries on field.
- Individual, companies, and non-governmental agencies should contribute to training and provision of safety equipment to farmers on field.

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