Herald Journal of Agriculture and Food Science Vol. 1 (1), pp. 026 - 032 August, 2012
Available online http://www.heraldjournals.org/hjafsr/archive.htm

ISSN: 2350 - 2193

Full Length Research Paper

Analysis of occupational and environmental hazards associated with cassava processing in Edo state Nigeria

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Received July 31, 2012 Accepted 16 August, 2012

Farming has been described as one of the most hazardous activities by many authors. The study was conducted to analyse occupational and environmental hazards associated with cassava processing and analysed the knowledge level of the processors on the hazards associated with cassava processing. A multistage sampling procedure was adopted in selecting the respondents for the study. One hundred and eighty respondents were sampled for the study using interview schedule but only one hundred and seventy-one questionaires were suitable for analysis. The data collected were described using frequency count, percent, mean, standard deviation and pie charts while perason' correlation was employed to make deductions. Results show that majority (79.9 %) of the respondents were female with about 68.4 percent married. Majority (62.6%) of the respondents were rated as having moderate knowledge of hazards associated with cassava processing. Age (r=0.5271), years of schooling (r=0.7251) and level of travelling (r=0.4139) were found to be significantly correlated with knowledge of hazards at 0.01 level of significance while household size (r=0.3815) had positive and significant relationship with hazards at 0.05 level of significance. The study therefore established that education could be used to educate cassava processors on the various hazards associated with cassava processing in the study area.

Keywords: Cassava Processors, Hazards, Occupation, Environment

INTRODUCTION

Cassava (*Manihot esculenta* Crantz) is a staple food for over 600 million people in large parts of sub-Saharan Africa, South America and Asia. More than half of the world's cassava is produced in Africa, where it is a cheap and major source of calories for over 40% of the population (Arthur *et al*., 2009). The crop is efficient in production of carbohydrates and is adapted to a wide range of environments. The crop is preferred by most resource-constrained farmers because of its low input requirements, tolerance to low rainfall and poor soils and ease of propagation by use of vegetative stem cuttings compared to most other crops. Cassava can be planted any time of the year, harvested year round, and harvesting for some varieties can be 'piece-meal' and take place for up to four years. These attributes make cassava one of the most reliable famine reserve and food security crops in Africa (Hahn and Keyser, 1985, Hahn *et al.,* 1987). The wide flexibility in planting and harvesting time enables farmers to allocate their spare time to cassava after attending to more season-bound crops such as maize and yam.

Cassava is grown in Africa mostly for use as food. By contrast, about half of total cassava production in Asia and less than half of cassava produced in South America are used as food. Total consumption of cassava in Africa more than doubled from 24 million tons per year in 1961 to 1965 to 78 million tons per year in 1994 to 2005, after accounting for waste (Halsey *et al.,* 2008; Adebayo and O. Salahu, 2007). It is a widely grown staple crop in Nigeria, covering a very large hectare of land (Omueti,

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Figure 1a. Pressing of grated cassava to release effluent using improved method.

Figure 1b. Pressing of grated cassava to release effluent using local method

2004). Oyegbami (2010) reported that food products from cassava include *gari (*fermented and roasted granules) *fufu* (fermented and steamed cooked), *pupuru* (fermented smoked dried balls and also gelatinized), *lafun* (fermented, sun dried flour and then gelatinized for the table). Among the people of Uhunwode local government area of Edo State, the most popular product of cassava are garri and apu which are found as the common foods among the people in these areas. Cassava has been found to be a great giant that fights hunger and provides earnings for the farmer. Hence, in area of food security for Nigeria and other African countries cassava play a major role. Owing to this aforementioned significance of the crop, its processing must be given high attention because of its roles in combating hunger especially in the developing countries where it is the cheapest food used to combat hunger and generate income (Omueti, 2004).

Obadina *et al*., 2007 reported that cassava processing in South-western Nigeria is carried out in a highly contaminated environment. The study recommended that education of processors on the hazards, critical control point (CCP) and the importance of hygienic environment is imperative in ensuring that the level of contamination of the produce is reduced. Also, Oyegbami *et al.,* 2010 in the study 'cassava processors' awareness of occupational and environmental hazards associated with cassava processing in south-western Nigeria' found that improper channeling of the cassava effluent constitute the major environmental hazzards in associeted with cassava processing in the study areas as shown in Figure 1. Ganiyu (2005) opined that processing of cassava tubers for the production of nutrient enriched forms such as cassava flour, garri fufu, pupuru, lafu in which it is popularly consumed in Nigeria is usually accompanied with the production of stinking wastewater which usually constitute nuisance to both terrestrial and aquatic life. The study further asserted that the two major wastes generated during cassava processing namely the cassava peels and the effluents were reported to cause a lot of havoc to vegetations, houses and bring about infection of microbe and infestation. While the traditional and improved processing methods presently adopted in the country have lead to various pathology ranging from general body high temperature due to smoke from the

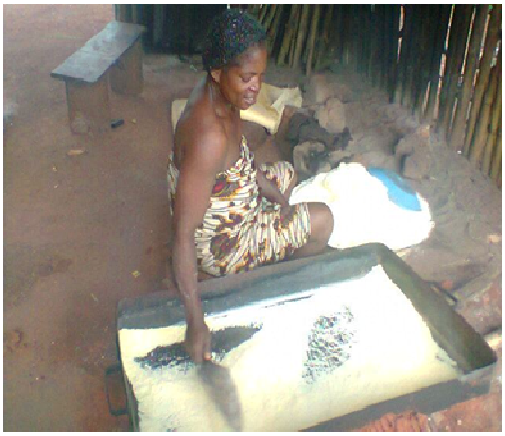


Figure 2. A woman processing cassava into Garri through frying.

Figure 3. A woman transporting cassava tubers from the farm to the processing site.

frying pan to fatigue, ache and pains (Oboh, 2004) as shown in Figure 2.

Furthermore, processing of cassava into these products mentioned above comes with a lot of environmental as well as occupational hazards. The effects of these can also be transferred to the consumers who eventually buys and consumes the product. It is generally believed that man cannot be separated from his environment thus, Oyegbami submitted that Cassava processing activities have both positive and negative effects on the environment, vis-à-vis the environment's response either positive or negative to the activities of man (Oyegbami, 2010). For example, littering of the environment with refuse destroys the freshness, cleanliness and aesthetic value of such environment. The environment responds to this negative effect in form of stenches and microbial load, which may be injurious to man's health (Omueti, 2004). Also, exposing oneself to the accident that can be sustained during grinding using motorised machnines as well as the heat emanating from the source of frying could be dangarous to ones health. The risk of lives involved in transporting the uprooted cassava (Figure 3) from the farm to the processing sites and the various crude ways of processing the crop call for concerns in the study area. Therefore, the interaction between the environment and man together with his activities should be of concern and should be adequately addressed in order to reduce some of the hazards associated with cassava processing in the study area. Several studies have been carried out in relation to cassava production and processing but little seems to have been done relation to occupational and environmental hazards associated with cassava production. The study therefore seeks to investigate the occupational and environmental hazards associated with cassava processing in Edo State. Specifically, the study analysed the knowledge level of the processors on the hazards associated with cassava processing.

The study hypothesized that there was no significant relationship between the socioeconomic characteristics of respondents and their knowledge of hazards associated with cassava processing.

MATERIAL AND METHOD

The study was conducted in Edo State of Nigeria. Edo State is located in the south southern region of Nigeria which is the forest zone of the country. It lies between latitudes 4^0 45' and 7^0 40' North of the Equator and longitudes 5^0 and 6^0 45' East of prime meridian. It covers land area of 17,802km2 with the population of 3,218,332 people according to 2006 national population census (NPC, 2006). The state has two distinct climatic seasons: the wet season which starts by April and ends by October and the dry season which is from November to March. Relative humidity and rainfall are high giving rise to thick vegetation cover. The major occupation of the inhabitants of the study area is agriculture. Agricultural practices carried out in the area include arable and tree crops production and the common arable crops grown are cassava, yam, maize while fishing, snailry, aquaculture, poultry and livestock rearing are also found among the inhabitants.

Sampling Technique

A two multi-stage sampling technique was used in selecting the respondents for the study. The first stage involved a purposive selection of Edo south agro-ecological zone based on the predominance of cassava processing activities. At the second stage, three blocks (Uhunmwode, Orhionmwon and Egor) out of seven were randomly selected. The third stage involved the selection of four communities from each of the blocks to make a total of twelve communities. At the fourth stage, fifteen cassava processors were randomly selected in each of the communities. 180 cassava processors were interviewed for the study. However, only 171 out of 180 questionaires were suitable for analysis.

Data Collection

Data for the study were collected by means of a well-structured and pre-tested questionnaire and interview schedule. Data were collected on the socio-economic characteristics of the respondents and knowledge level of respondents to hazards attitude towards hazards as well as challenges in processing of cassava.

Validity and Reliability of Questionnaire

The validity of the questionnaire was tested using content validity. The simplest and most direct method was used and the content of the questionnaire was adjudged 'satisfied' by professional in the field of Agricultural Extension. Reliability of the instrument was tested using the test-retest technique. Copies of the questionnaire were first administered twice and person correlation coefficient between the two sets of responses was computed. High correlation coefficient was obtained indicating that the research instrument was reliable.

Data Analysis

Data analysis was done using descriptive statistics such as frequency counts, perecntage, mean, standard deviation and charts while correlation analysis was used to make deductions from the study. SPSS version 14 and CoStat were used to analyse the data.

RESULTS AND DISCUSSION

Results in from the survey shown that about 42.0 percent of the respondents were found within the age brackets of 31-40 years; 31.0 percent were within 41-50 years while only 2.0 percent were found between the ages of 61 years and above with a mean age of 39.6 and standard deviation of 13.1. This indicates that cassava processors in the study areas were in their prime and active ages as shown in Figure 4.Table 1 shows that majority (20.5%) of the respondents were female and only 20.5 percent were male. This finding agrees with Oyegbami *et al.,* (2010) which found that about 68.9 percent of cassava processors in South-western Nigeria are female. This indicates that women are more involved in cassava processing than men. The study further showed that women played a key role in farm family sector and were the principal producers of its subsistence agricultural production and also the prime producers of staple food. ; This corroborates the study of Adebayo and Salahu (2007). Majority (68.4%) of the respondents were married and about 12.5 percent of the respondents were separated with only 5.3 percent of the respondents found as single. Results in Table 1 also indicate that about 47.4 percent of the respondents had between 5-9 persons as the household size while only 14.6 percent of the respondents had between 1-4 persons per household and 31.6 percent had between 10-14 persons per house. Marital status of the respondents could be responsible for the relatively high number of persons per household in the study areas as majority (68.4%) of the respondents were found to be married.

Results in Table 2 indicate that majority (42.7%) of the respondents spent between 7-12 years in schooling while only 6.4 percent of the respondents spent between 13 years and above in schooling. However, relatively high proportion (35.7%) of respondents spent zero year in schooling. This indicates that majority (42.7%) of the respondents had secondary education as their highest education while 35.7 percent of the respondents did not have formal education. Also, majority (38.6%) of the respondents Also, majority (38.6%) of the respondents travelled occassionally while only 12.9

Table 1. Distribution of respondents' socio-economic characteristics. N= 171

Variables	Frequency	Percentage
Sex		
Male	35	20.5
Female	136	79.5
Marital status		
Single	9	5.3
Married	117	68.4
Separated	21	12.3
Divorced	16	9.4
Widowed/widower	8	4.6
Household size		
1-4	25	14.6
5-9	81	47.4
10-14	54	31.6
15 and above	11	6.4

Source: Own survey, 2012.

Table 2. Distribution of respondents' socio-economic characteristics. N=171

Variable	Frequency	Percentage
No of years spent in schooling		
No formal education	61	35.7
1-6	26	15.2
7-12	73	42.7
13 years and above	11	6.4
Level of travelling		
Never travelled	19	11.1
Rarely	38	22.2
Occassionally	66	38.6
Often	26	15.2
Very often	22	12.9

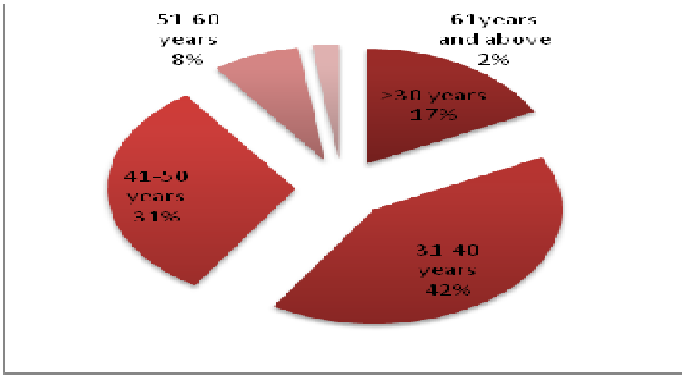
Own survey, 2012. Multiple responses given

percent of the respondents travelled very often and 11.1 percent of the respondents had never travelled out of their communities. This indicates that high proportion of the respondent travelled occassionally. For the sources of information, about 75.4 percent of the respondents indicated that friends and neighbours were their sources of information while only 2.9 percent of the respondents shown that print media (newspapers, magazine etc) were their sources of information. Also, 13.5 percent of the respondents indicated that they recieved agricultural information through the Agricultural Development Programme (ADP) as shown in fig 5. These analyses revealed that the major sources of information among the respondents is friends/neighbours. It can be deduced that the impact of ADP will be minimal in the study areas.

Figure 4 revealed that majority (44.4%) of the respondents had an annual income of less than ₦100,000 and about 36.3 percent of the respondents had between ₦100,001- ₦500,000 annually from cassava porcessing while only 6.4 percent of the respondents had over ₦1,000,000 annually from cassava. This shows that majority (44.4%) of the respondents had low annual income of less than ₦100,000 from cassava.

Level of knowledge of occupational hazards in cassava processing

The information on the processors' knowledge of occupational hazards associated with cassava processing was presented in Table 3. The results show that skill irritation was most occurring and as such rated first. Cut/bruise from peeling of cassava was rated second while aches and pains and fatique were the least mentioned hazards associated with cassava processing , rated 4th and 5th respectively. In a further analysis, each of the respondents were subjected to indepth study in order to rate them based on the number of hazards they mentioned in relation to the sample size. The results presented in figure 6 show that 62.6 percent had a moderate knowledge of hazards associated with cassava processing while only 10.8 percent had a high level of knowledge of the various hazards associated with cassava processing. This analysis indicated that majority (62.6%) of the



mean= 39.6, St Dev= 13.1
Figure 4. Age distribution of the respondents

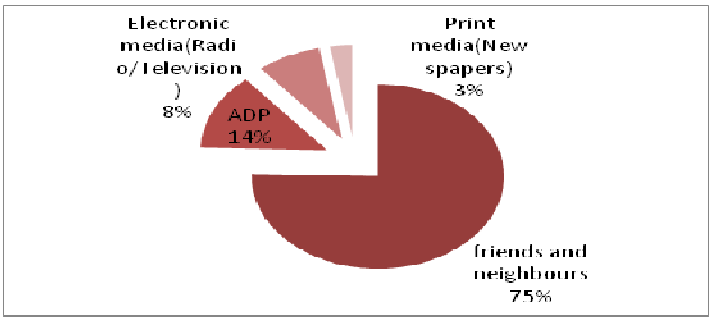


Figure 5. Distribution of respondents sources of informat

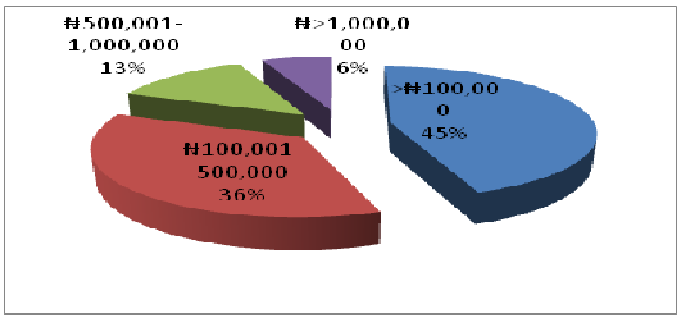


Figure 6. Distribution of respondents annual income from cassava

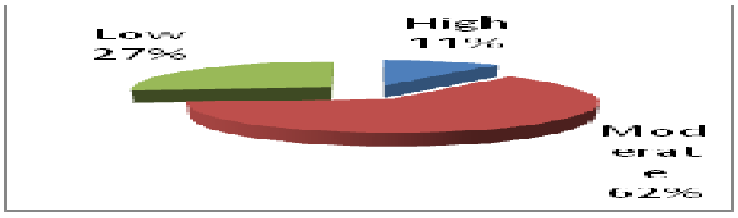


Figure 7. Distribution of respondents' knowledge level of occupational hazards

respondents had moderate knowledge of hazards in cassava processing while few (10.8%) were rated high. This suggests that there is a medium knowledge level of cassava processing hazards in the study areas. More so, responses on the knowledge level of environmental hazards in cassava processing were

Table 3. Distribution of respondents' knowledge of hazards associated with cassava processing N=171

Variables	Frequency	Percentage	Rank
Skin irritation	141	82.5	1st
Eye irritation	107	62.6	3rd
Fatique	52	30.4	5th
Aches and pains	72	42.1	4th
Cut/bruise	133	77.8	2nd

Source: Own survey, 2012

Table 4. Distribution of respondents' knowledge of environmental hazards associated with cassava processing N=171

Variables	Frequency	Percentage	Rank
Destruction of building by effluent	96	56.1	3rd
Stench from peels and effluent	168	98.2	1st
Insect infestation	102	59.6	2nd
Disease infestation	70	40.9	4th
Destruction of soil microbes by the effluent	18	10.5	5th

Source: Own survey, 2012. Multiple responses given

Table 5. Result of correlation analysis showing linear relationshipbetween respondents' socioeconomic characteristics and their knowledge of hazards in cassava processing

Variables	Correlation coefficient (r)	Coefficient of determination (r^2)
Age	0.5271**	0.2778
Household size	0.3815*	0.1455
Years of schooling	0.7251**	0.5257
Income	0.2830	0.0801
Level of travelling	0.4139**	0.1713

Source: own survey, 2012.

presented in Table 4. Results show that stench from heap of peels and effluent were rated first with majority (98.2%) of the respondents mentioned it. Insect infestation was rated second while destruction of soil microbes by the effluent was the least mentioned with 10.5 percent of the respondents having the knowledge of it. Also, destruction of building especially roofing sheet by the effluent was rated third and disease infestation was rated fourth.

The results of correlation analysis showing the relationship between the respondents' knowledge of hazards and their selected socio-economic characteristics show that at 99% level of probability, age (0.5271), years of schooling (0.7251) and level of travelling (0.4139) had significant relationship with knowledge of hazards in cassava processing and at 95% probability level, there was a significannt relationship between household size (0.3815) and knowledge of hazards among the processors. The coefficient of determination gives the percentage of contribution of each independent variable to the dependent variable. Therefore, age of respondents contributes about 27.78 percent to the knowledge of hazards while years of schooling contributes about 52.57 percent to the knowledge of hazards. This implies that the higher the years spent in schooling, the higher the knowledge of hazards. This findings corroborate Ajayi and Jibowo (2004).

CONCLUSION

It has been established that cassava processors in Edo State are susceptible to a number of occupational and environmental hazards, many of which are avoidable and preventable with proper knowledge. However, the study revealed that majority of the processors had moderate knowledge of the hazards associated with cassava processing while few were found with high knowlwdge of hazards, therefore, processors are constantly exposed to these hazards on the field. The study also established that years of schooling, age, level of travelling and household size had significant positive correlation with knowledge of hazards associated with cassava

processing. These variables are therefore very crucial to any intervention programme aim at mitigating against these hazards. The study therefore recommends that education (adult education) should be employed to educate the processors on the various hazards assiciated with cassava processing in the study area in order to reduce the risks associated with these hazards.

REFERENCES

Adebayo K, Salahu OD (2007). Processors perception of the effect of the presidential initiative on cassava in the industry in Ogun state. Nigerian Journal of Rural sociology 2007; 7 (1and2)**:** 25-38.

Ajayi A. O, Jibowo AA (2004)**.** Determinants of rural children's knowledge of hazards associated with farming in oyo state, Nigeria. J. Social Sciences 9(3): 195-200.

Arthur MM, Titus A, Barbara ZM, Herbert KO (2009). A handbook for the conduct of confi ned fi eld trials of transgenic cassava in Uganda. Uganda National Council for Science and Technology. Pp 45-56

Ganiyu O (2005). Isolation and characterization of amylase from fermented cassava (*Manihot esculenta* Crantz) wastewater.

Hahn SK, Keyser J (1985). Cassava: A basic food of Africa. Outlook on Agriculture. 14 (2): 96-98.

Halsey ME, Olson KM, Taylor NJ, Chavarriaga AP (2008). Reproductive biology of cassava (*Manihot esculenta* Crantz) and isolati on of experimental fi eld trials. Crop Science 48:49-58.

National Population Census, 2006.

Obadina AO, Oyewole OB, Sanni LO, Tomlins KI, Westby A (2007). Identication of Hazards and Critical Control Points (CCP) for Cassava fufu Processing in South-West Nigeria

Oboh G (2004). Management of Occupational Hazards Associated with Traditional Methods of Cassava Processing in Ogun, Ondo and Oyo States, Nigeria. In: Proceedings of A Workshop on Promotion of Improved Mangt. Technol. Aimed at Reducing Occupational and Environ. Hazards Associated with Traditional Cassava Processing in Ogun, Ondo States. Inst. Agric. Res. Training, Obafemi Awolowo University Ibadan, Nigeria. pp. 11-20.

Omueti O (2004). Traditional cassava processing and improved management practices. In: Proceedings of a workshop on promotion of improved management technologies aimed at reducing occupational and environmental hazards associated with cassava processing in Ogun, Ondo and Oyo States, 1-5.

Oyegbami A, Oboh G, Omueti O (2010). Cassava Processors' Awareness of Occupational and Environmental Hazards Associated with Cassava Processing in South-Western Nigeria. African J. Food Agric. Nutrition and Development. 10(2), 2176-2186.